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ENGLISH for OIL and GAS INDUSTRY

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**O`ZBEKISTON RESPUBLIKASI OLIY VA O`RTA MAXSUS TA`LIM
VAZIRLIGI**

BUXORO MUHANDISLIK-TEXNOLOGIYA INSTITUTI

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ENGLISH FOR OIL AND GAS INDUSTRY

5311900 -“Neft va gaz ishi (Neft va gaz konlarini ishga tushirish va
ulardan foydalanish)” va 5321400 - “Neft-gaz kimyo sanoati
texnologiyasi” bakalavriat ta`lim yo`nalishida tahsil olayotgan talabalar
uchun darslik

Toshkent - 2021

Ushbu darslikni yaratishda mualliflar bugungi kunda nofilologik yo'nalishlarda til o'rganishning asosiy yondashuvlari hisoblangan STEM/STEAM tizimi va CLIL texnologiyasiga asoslanganlar. Darslikdagi leksik mavzular neft va gaz sanoati atamalari va jarayonlarini o'rganishga mo'ljallangan bo'lib, ular ushbu sanoat bosqichlarining to'g'ri ketma-ketligida berilgan. Bu yerdagi mashq va topshiriqlar to'rtta til konikmasi: o'qib tushunish, yozish, tinglan tushunish va gapirishga asoslangan. Darslikda beshta bo'lim mavjud va har bir bo'lim oxirida talabalar mavzularni qanchalik o'zlashtirganliklarini tekshirishlari uchun test savollari, darslikning oxirida takrorlash uchun grammatik ma'lumotnoma va lug'at berilgan.

Darslik O'zbekiston Respublikasi Oliy va o'rta maxsus ta'lim vazirligi tomonidan tasdiqlangan namunaviy dastur asosida tayyorlangan bo'lib, 5311900 - "Neft va gaz ishi (Neft va gaz konlarini ishga tushirish va ulardan foydalanish)" va 5321400 - "Neft-gaz kimyo sanoati texnologiyasi" ta'lim yo'nalishida tahsil olayotgan talabalar uchun mo'ljallangan.

При создании этого учебника авторы опирались на систему STEM / STEAM и технологию CLIL, которые сегодня являются основными подходами к изучению языка в нефилологических ВУЗах. Лексические темы в учебнике предназначены для изучения терминов и процессов нефтегазовой промышленности, которые представлены в правильной последовательности этих отраслевых этапов. Упражнения и задания здесь основаны на четырех языковых навыках: понимание прочитанного, письмо, понимание прослушанного и говорение. Учебник состоит из пяти разделов, и в конце каждого раздела есть тестовые вопросы для самопроверки, а также грамматический справочник для повторения и словарь в конце учебника.

Учебник подготовлен на основе типовой программы, утвержденной Министерством высшего и среднего специального образования Республики Узбекистан, и предназначен для студентов, обучающихся по направлениям 5311900 - "Нефтегазовое дело (введение в эксплуатацию и эксплуатация нефтегазовых месторождений)" и 5321400 - "Технология нефтегазохимической промышленности".

In compiling this textbook, the authors relied on the STEM / STEAM system and CLIL technology, which are the main approaches to language learning in non-linguistic universities today. The lexical topics in the textbook are intended to study the terms and processes of the oil and gas industry, which are presented in the correct sequence of this industry's stages. The exercises and assignments are based on four language skills: reading, writing, listening and speaking. The textbook consists of five units, and at the end of

each unit there are tests for progress check, as well as a grammar reference for revision and a vocabulary at the end of the textbook.

The textbook is compiled on the basis of the curriculum approved by the Ministry of Higher and Secondary Specialized Education of the Republic of Uzbekistan and is intended for students studying in the directions 5311900 - "Oil and gas business (setting in operation and exploitation of oil and gas fields)" and 5321400 - "Technology of the oil and gas chemical industry".

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PREFACE

*Good teaching must be slow
enough so that it is not confusing,
and fast enough so that it is not boring.*

Sidney J. Harris

The adoption of the decrees of the first president of Uzbekistan Islam Karimov “On measures on further improving of teaching foreign languages” on 10 December 2012 and the present-day President of the Republic of Uzbekistan SH.M. Mirziyoyev № 2909, dated April 20, 2017 “On measures for the further development of higher education” was the essence of the country’s reforms in the field of foreign language teaching and the whole system of higher education.

The main aim of these documents is to improve teaching foreign languages, training specialists with good language skills, introducing advanced technologies into education system, etc. According to the decrees, foreign languages, predominantly the English language, will be taught in many educational institutions of Uzbekistan.

The relevance of learning English is dictated by the needs of the modern world. Nowadays, the English language has become an international language of communication. The President of our country Shavkat Mirziyoyev pays special attention to this sphere, which has an important place in ensuring the future of the country and its development. In the Decree of President of Uzbekistan Shavkat Mirziyoyev «On Uzbekistan’s development Strategy ” it is mentioned about achieving major improvement of the quality of general secondary education, facilitating in-depth study of foreign languages, computer science, and other important and popular disciplines.

This textbook is compiled to meet the above mentioned needs and demands. It consists of five units containing the topics about oil and gas industry. Each unit has four topical lessons with the activities and exercises based on four language skills.

The rich selection of motivating and informative, authentic and semi-authentic texts enables students who learn English for Specific Purposes to improve both reading and listening skills. The exercises and activities for writing and speaking guide students to critical and abstract thinking.

As the textbook is compiled on the principles of STEM, STEAM and CLIL technologies, it gives students a chance to improve not only language skills, but also to gain information on their specialty.

Unit I. The origin of oil and gas.

Lesson 1. What is oil?



Read the text. What is Oil?

1. There is magic in oil, that smelly black liquid which forms greasy puddles on the garage floor.

2. Gasoline, the main product of crude oil, or petroleum, runs our cars, trucks, buses, and boats. Before the day of our swift transportation, people travelled in horse-drawn vehicles, or by train.

3 The oil used for heating is another product of petroleum." Natural gas found with petroleum, is burned in millions of kitchen stoves. Still other petroleum products, called petrochemicals, are used to make paints, cleaners, waxes, medicines, and hundreds of other things.

Abundant sea
life helped
form
petroleum
beneath the
ocean floor.



4 Crude oil is a black, heavy liquid made up almost entirely of two elements hydrogen and carbon. Hydrogen is a gas. Carbon is a solid which we know best as charcoal or the graphite in lead pencils. When these two elements are combined in the right proportion, together with atoms of other elements, a liquid called petroleum, or crude oil, is formed.

5 This combination of atoms took place inside the earth millions of years ago. In prehistoric days, great fires in the centre of the earth exploded the cooling outside crust into huge piles, forming continents and mountains ranges. Thousands of years later the rock was softened and crumbled by wind and rain until plants could grow.

6. The earth's uneasy surface was still being churned by earthquakes and volcanoes. Whenever such an eruption occurred, much vegetation and billions of animals and fish were buried deep under mud, washed down by violent rains. As time passed and more sand and mud flowed down, the enormous weight squeezed the bottom layers until they turned to stone. The partly rotted animals and plants trapped between the layers of stone were changed by heat and pressure. In some cases coal was formed. In other layers, especially when sea creatures were present, oil was formed.

7. This oil was forced by the enormous pressure from above into the tiny pores of soft rock like sandstone or limestone. The oil was pushed along through the porous rock by the pressure of water which has also seeped in. The water forced the oil ahead of it until it reached hard rock which it couldn't pass. Here it stayed, trapped in an oil pool, along with a certain amount of natural gas.

8. Sometimes oil found its own way to the surface through cracks in the stone layers, usually along with springs of water. Oil from one area is often quite different from that found in another. Some crude oil contains much gasoline, while another sort is rich in lubricants. One type will have an asphalt base, another will have a paraffin or wax base. Some oils are very dark, others are light. Even the weight differs.



Vocabulary. Match the words 1-11 with their definitions a-k.

- | | |
|-----------------|---|
| 1.gasoline | a. a chemical element that forms diamonds and coal and that is found in petroleum and in all living plants and animals |
| 2.petroleum | b. a shiny black substance that is used in pencils |
| 3.petrochemical | c.to burst forth with sudden violence or noise from internal energy |
| 4.hydrogen | d. a mountain with a hole in the top or side that sometimes sends out rocks |
| 5.carbon | e. a sedimentary rock consisting of usually quartz sand united by some cement |
| 6.charcoal | f. a liquid made from petroleum and used especially as a fuel for engines |
| 7.graphite | g. a rock that is formed chiefly by accumulation of organic remains (such as shells or coral), consists mainly of calcium carbonate |
| 8.explode | h. a chemical isolated or derived from <u>petroleum</u> or natural gas |
| 9.volcano | i. a hard black material that is made by burning wood with a small amount of air |
| 10.sandstone | j. a nonmetallic gaseous chemical element with atomic number 1 that is the simplest and lightest of the elements and that is used especially in the processing of fossil fuels and the synthesis of ammonia |
| 11.limestone | k. crude oil |

Activity 1. Learn the vocabulary above and use them in your speech.

Reading comprehension

Exercise 1. Use the words and word combinations from the text to complete the sentences.

1. There is magic in oil, that smelly black liquid which forms ... on the garage floor. 2. Still other petroleum products, called petrochemicals, are used to make paints, ..., waxes, ..., and hundreds of other things. 3. Crude oil is a black, heavy liquid made up almost entirely of two elements 4. When these two elements are combined ..., together with atoms of other elements, a liquid called petroleum, or crude oil, is formed. 5. The earth's uneasy surface was still being churned by 6. This oil was forced by the enormous ... from above into the tiny pores of soft rock like sandstone or limestone. 7. Sometimes oil found its own way to the surface through cracks in the stone layers, usually along with 8. Some crude oil contains much gasoline, while another sort is rich in

Exercise 2. Match the headings (a-h) with the paragraphs (1-8)

a) The role of sedimentation in the formation of oil

b) Oil in our everyday life

c) Oil

d) Difference in different types of oil

e) The structure of petroleum

f) Changes happened inside the earth

g) Oil product which runs our vehicles

h) Oil's going out

Exercise 3. Write true (T), false (F) or not given (NG).

1. Oil does not have smell.
2. Gasoline is one of the oil products having essential place in transportation today.
3. All oil products have their own role in our everyday life.
4. The right proportion of hydrogen and carbon is not important in the formation of petroleum.
5. Hydrogen and carbon help plants grow in vigorous air conditions.
6. Earthquakes and volcanoes did not have any influence on the formation stone and coal.
7. Hard rock prevented oil to go out.
8. Structure of oil should be studied because oils are different in different areas.



Listen. 1. Match the oil fields to the countries or state.



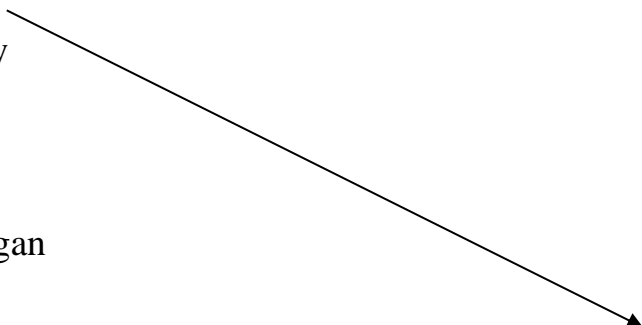
13 Track 13.mp3

Oil fields

- 1 Samotlor
- 2 Prudhoe Bay
- 3 East Texas
- 4 Cantarell
- 5 Greater Burgan
- 6 Rumaila
- 7 Ghawar
- 8 Bolivar Coastal

Countries or state

- a) Venezuela
- b) Mexico
- c) USA
- d) Saudi Arabia
- e) Kuwait
- f) Alaska
- g) Iraq
- h) Russia



Speaking. Activity 1. Work in pairs and discuss the following questions.

1. Why is oil important in our everyday life?
2. What would our life be like if there were no oil?

Exercise 1. Answer the following questions.

1. What is the role of gasoline in our everyday life?
2. What kind of oil products are used in our life?
3. What are the main components of oil?
4. What happened outside crust of the earth in prehistoric days?
5. What happened when earthquakes and volcanoes occurred?
6. How were coal and oil formed between the layers of stone?
7. How did oil go out?
8. How does oil from one area differs from that found in another?



Writing. Write about the job you would like to have. Why would you like this job? Use these words and phrases.

I think I'd like to be a ...

You need to be

You have to know about

Another reason is that

One reason is that ...

You mustn't

Lesson 2. The history of oil



Read the text. The history of oil

1. The first modern man to drill (bore a hole in the ground) for oil was named Drake. He built the wooden derrick for this purpose in Titus-ville, Pennsylvania, USA. It was called Drake's Folly, because, at first, many things were wrong. But when he struck oil in 1859, and brought it up from 69 feet below ground, people did not think him so foolish.

2. Up to middle 1800's nobody was much interested in producing oil in large quantities because there was no great need for it. In a limited way oil had been used for thousands of years. In ancient cities in Egypt and Asia builders used asphalt to

pave their roads. Egyptians dipped the bandages used to wrap around their mummies in pitch, a petroleum product. The Greeks and Romans oiled their chariot wheels with petroleum, a name derived from *petra*, meaning rock, and *oleum*, meaning oil.

3. In early times oil was used as a medicine believed to cure leprosy, rheumatism, and toothache. In America, long before European colonists arrived, Indians were skimming off the oil floating on the surface of certain springs. They used it to treat rheumatism, burns, and coughs.

4. Until the middle of 1800's, however, very few people wanted or needed oil. In fact, to the salt makers, it was an out-and-out nuisance. These men dug wells near the great salt deposits and pumped up the brine which was then evaporated, leaving a crust of pure salt. Salt makers often found oil mixed in their brine, which ruined it for salt making. They were then forced to abandon their salt wells.

5. For centuries people had been getting along with the feeble glow from candles. All work was done by daylight, and people went to bed shortly after dark. Then, early in the nineteenth century, it was found that a lamp filled with whale oil gave a brighter, cleaner light. The great whaling industry grew up to supply the increasing demand for whale oil. At last whales became so scarce that whale-oil production began to drop steadily. At the same time, more and more people needed lamp oil. Something had to be found to take place of whale oil!

6. By this time there was another fast growing need. New machines were beginning to be used all over the civilized world. New machines were being invented to weave cloth, cut lumber, make nails, manufacture railroad locomotives, and produce hundreds of other things. And something was needed to lubricate them. So even before the automobile industry gulped down billions of gallons of gasoline each year, the stage was set for the appearance of the new giant - oil.



Vocabulary. Match the words 1-17 with their definitions a-q.

- | | |
|------------|---|
| 1. drill | a. water saturated or strongly impregnated with common salt |
| 2. derrick | b. to convert into vapor |

3.to pave	c. oil obtained from the blubber of whales
4.dip	d. a flammable hydrocarbon <i>oil</i> used as fuel in <i>lamps</i> and heaters.
5.pitch	e. form (fabric or a fabric item) by interlacing long threads passing in one direction with others at a right angle to them
6.wheels	f. produce (a hole) in something by or as if by boring with a drill.
7.pump	g. a circular frame of hard material that may be solid, partly solid, or spoked and that is capable of turning on an axle
8.brine	h. apply a substance such as oil or grease to (an engine or component) so as to minimize friction and allow smooth movement
9.evaporate	i. a hoisting apparatus employing a tackle rigged at the end of a beam
10.whale oil	j.to plunge or immerse momentarily or partially under the surface (as of a liquid) so as to moisten, cool, or coat
11.candles	k. any of various bituminous substances
13.lamp oil	l. a powered railway vehicle used for pulling trains.
14.weave	m. a unit of measurement used for liquids such as gasoline, water, and milk in the United States
15.locomotive	n. a usually molded or dipped mass of wax or tallow containing a wick that may be burned (as to give light, heat, or scent or for celebration or votive purposes)
16.lubricate	o. to exert oneself to pump or as if to pump something
17.gallons of gasoline	q. to lay or cover with material (such as asphalt or concrete) that forms a firm level surface for travel

Activity 1. Learn the vocabulary above and use them in your speech.

Reading comprehension

Exercise 1. Use the words and word combinations from the text to complete the sentences.

1. The first modern man ... for oil was named Drake. 2. Up to middle 1800's nobody was much interested in ... oil in large quantities because there was no great ... for it. 3. ... oiled their chariot wheels with petroleum, a name derived from petra, meaning rock, and oleum, meaning oil. 4. Indians used oil ... rheumatism, burns, and coughs. 5. Then, early in the nineteenth century, it was found that a lamp filled with ... oil gave a brighter, cleaner light. 6. And something was needed ... them. 7. So even before the gulped down billions of gallons of gasoline each year, the stage was set for the appearance of the new giant - oil.

Exercise 2. Match the headings (a-f) with the paragraphs (1-6)

- a) The usage of oil in medicine.
- b) Need for animal oil.
- c) The first drilling rig.
- d) The sphere where oil was unwanted.
- e) The fields where oil products used in the early 19th century.
- f) The reasons for another rapidly growing need.

Exercise 3. Write true (T), false (F) or not given (NG).

- 1. At first people laughed at Drake when he built a wooden derrick to drill for oil.
- 2. Up to middle 1800's oil products were needed in a few spheres of life.
- 3. In early times oil was used to prevent some diseases.
- 4. The salt makers didn't want come across oil, because mixed in their brine, which ruined it for salt making.
- 5. The main reason for whales' getting rare was that people ate its fat.

6. There was fast growing need for oil for transporting things and people.

Exercise 4. Answer the following questions.

1. Why was Drake's wooden derrick called Drake's Folly?
2. Why was there no great need for oil up to middle 1800's?
3. What diseases were treated with oil?
4. Why was oil an out-and-out nuisance to the salt makers?
5. Why did the great whaling industry grow up?
6. Why did the need for oil grow rapidly by this time?



Speaking. Work in group and discuss the following questions.

What old methods are used in oil and gas industry today? How do they work?



Writing. Answer the following questions in written form.

What new methods would you invent if you were an expert in oil and gas industry?
Why?



Listen.



100502-oil_spill.mp3

Listen and fill in the gaps.

American President Barack Obama has said the oil (1)____ British Petroleum (BP) is responsible for paying for cleaning up the huge oil spill (2)____ America's southern coast. The oil slick is now the size of Jamaica and has started washing up on beaches in Louisiana. Obama told reporters that BP "is (3)____ responsible under the law for paying the costs of response and cleanup operations". US Homeland Security Secretary Janet Napolitano (4)____ her boss' words. She called (5)____ BP to take urgent action to send resources to tackle the disaster. BP's CEO Tony Hayward is in

the area to personally direct the emergency (6)____ -up and damage limitation exercise. President Obama has also visited the area.

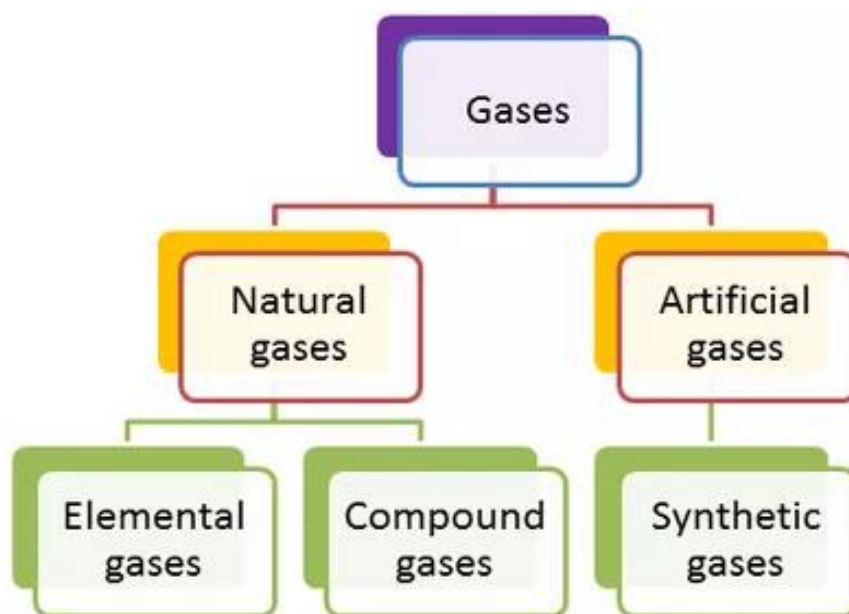
The catastrophe began last week when a BP (7)____ oil rig exploded and sank in the Gulf of Mexico. As much as 5,000 barrels of oil a day are now pouring into the sea. Experts believe it is on its (8)____ to becoming the worst oil spill in U.S. history. (9)____ worse than the 1989 Exxon Valdez disaster. The spill could cause enormous environmental and economic damage to the southern U.S. states. Alabama, Florida, Louisiana and Mississippi have all called a (10)____ of emergency. One of the biggest problems is the difficulty o(11)____ cleaning up the oil. The affected coastline is full of wetlands that are difficult to reach by boat. Hundreds of different species are (12)____ threat including very rare bird and marine life.

Lesson 3. Gases.



Read the text. Gases

1. According to obtaining and physical and chemical properties gases are subdivided into natural and artificial.



The natural gases are those which are formed and present in nature. The artificial gases are made by man from chemical reactions. The natural gases are again of two types as:

2. **Elemental gases:** These are the gases formed along with matter on earth and other planets. These gases are made of single element atoms. Examples include Hydrogen (H_2), oxygen (O_2), nitrogen (N_2), noble gases are the gases in the atmosphere. While Chlorine (Cl_2), Fluorine (F_2) are present in combination substances.

3. **Compound gases:** These are also gases formed in nature out of biological processes. These are chemically made of two or more elements. They are formed by combination of carbon, oxygen, nitrogen, hydrogen, nitrogen. Ex: carbon-dioxide (CO_2), methane (CH_4), sulfur dioxide (SO_2), ammonia (NH_3) etc.

4. These gases are present even before life existed on earth. So they are not harmful to nature as long as their concentration in the air ratios is not disturbed a lot.

5. The artificial gases are those which are synthesized by chemical reactions. They are made of many elements besides those listed above. These artificial gases include chloroform carbons, anesthetics, sterilizing agents etc. They are made by industrial processes for our use. These are meant for special needs of man but are not useful to nature. In turn some of them are harmful to the nature.



Vocabulary. Match the words 1-6 with their definitions a-h.

- | | |
|--------------------------|--|
| 1.natural gases | a. a material made up of two or more different substances which are physically combined |
| 2.chemical reactions | b. fully or partly halogenated paraffin hydrocarbons that contain only carbon, hydrogen, chlorine, and fluorine, produced as volatile derivative of methane, ethane, and propane |
| 3.combination substances | c. to combine or produce by <u>synthesis</u> |
| 6.compound gases | d.to free from all viable microorganisms (as by the use of steam or dry heat) |
| 4.synthesize | e. flammable gas, consisting largely of methane and other hydrocarbons, occurring naturally underground association with petroleum) and used as fuel |
| 5.chloroflouro carbons | f. a substance that induces insensitivity to pain. |
| 10.anesthetics | j. chemical compounds that include an element from the noble gases, group 18 of the periodic table |
| 6.sterilizing agents | h. a process that involves rearrangement of the molecular or ionic structure of a substance, as distinct from a change in physical form or a nuclear reaction |

Activity 1. Learn the vocabulary above and use them in your speech.

Reading comprehension

Exercise 1. Use the words and word combinations from the text to complete the sentences.

1. According to gases are subdivided into natural and artificial. 2. are the gases formed along with matter on earth and other planets. 3. are also gases formed in nature out of biological processes. 4. Compound gases are formed by combination of, nitrogen. 5. Compound gases are ... nature as long as their concentration in the air ratio's are not disturbed a lot. 6. are those which are synthesized by chemical reactions. 7. They are made of many elements besides those listed above. 8. Artificial gases are made by for our use.

Exercise 2. Match the headings (a-e) with the paragraphs (1-5)

- a) The reasons why compound gases are not harmful to nature.
- b) Gases consisting of single element atoms.
- c) Gases which are not made by nature.
- d) Gases containing two or more elements.
- e) Types of gases.

Exercise 3. Write true (T), false (F) or not given (NG).

- 1. Fossils form natural and artificial gases.
- 2. Noble gases exist in the air.
- 3. Compound gases consist of two or more elements.
- 4. Compound gases are harmful to nature because their concentration in the air ratios is disturbed a lot.
- 5. The artificial gases are widely used by man.

Exercise 4. Answer the following questions.

- 1. What is the difference between natural and artificial gases?
- 2. What types are natural gases divided?
- 3. What kind of gases are elemental gases?
- 4. How are compound gases formed?
- 5. Why are compound gases not harmful to nature?

6. What are artificial gases meant for?



Speaking. Look at the photos. Work in groups and discuss the following question.

What sectors of oil and gas industry do they describe?



Writing. Answer the following question in written form.

What is the role of natural gas in our everyday life?



Listen. Listen and write.



180613-fossil-fuels-
sp.mp3

Lesson 4. General characteristic of oil and gas



Read the text. General characteristic of oil and gas

1. Both crude oil and natural gas are mixtures of molecules formed by carbon and hydrogen atoms. There are many different types of crude oils and natural gases, some more valuable than others. Heavy crude oils are very thick and viscous and are difficult or impossible to produce, whereas light crude oils are very fluid and relatively easy to produce. Less valuable are sour crude oils that contain sulfur and sour natural gasses that contain hydrogen sulfide. Some natural gases burn with more heat than others, contain natural gas liquids and gasoline, and are more valuable.

2. In order to have a commercial deposit of gas or oil, three geological conditions must have been met. First, there must be a source rock in the subsurface of that area that generated the gas or oil at some time in the geological past. Second, there must be a separate, subsurface reservoir rock to hold the gas or oil. Third, there must be a trap on the reservoir rock to concentrate the gas or oil into commercial quantities.

3. The uppermost crust of the earth in oil- and gas producing areas is composed of sedimentary rock layers. Sedimentary rocks are the source and reservoir rocks for gas and oil. These rocks are called sedimentary rocks because they are composed of sediments.

4. Sediments are 1) particles such as sand grains that were formed by the breakdown of pre-existing rocks and transported, 2) seashells, or 3) salt that precipitated from of water. The sedimentary rocks that make up the earth's crust are millions and sometimes billions of years old. During the vast expanse of geological time, sea level has not been constant. Many times in the past, the seas have risen to cover the land and then fallen to expose the land. During these times, sediments were deposited. These sediments are relatively simple materials such as sands deposited along beaches, mud on the sea bottom, and beds of seashells. These ancient sediments,

piled layer upon layer, form the sedimentary rocks that are drilled to find and produce oil and gas.



Vocabulary. Match the words 1-13 with their definitions a-m.

- | | |
|-----------------------------|---|
| 1.crude oil | a. natural gas or any other gas containing significant amounts of hydrogen sulfide |
| 2.sulfur | b. a natural accumulation (as of iron ore, coal, or gas) |
| 3.sournatural gas | c. a subsurface body of rock having sufficient porosity and permeability to store and transmit fluids |
| 4.hydrogen sulfide | d. a device for drains or sewers consisting of a bend or partitioned chamber in which the liquid forms a seal to prevent the passage of sewer gas |
| 5.deposit | e. rock formed of mechanical, chemical, or organic sediment |
| 6.source rock | f. a sheet, quantity, or thickness of material, typically one of several, covering a surface or body |
| 7.subsurface reservoir rock | g. unrefined petroleum |
| 8.trap | h. a rock in which petroleum has originated |
| 10.sedimentary rock | j. a long slender column usually of timber, steel, or reinforced concrete driven into the ground to carry a vertical load |
| 11.layer | k. to cause to separate from <u>solution</u> or suspension |
| 12.precipitate | l. the chemical element of atomic number 16, a yellow combustible non-metal |
| 13.pile | m. a colourless poisonous gas with a smell of bad eggs, made by the action of acids on sulphides |

Activity 1. Learn the vocabulary above and use them in your speech.

Reading comprehension

Exercise 1. Find synonyms of the underlined words and word combinations.

1. Both crude oil and natural gas are mixtures of molecules formed by carbon and hydrogen atoms. 2. There are many different types of crude oils and natural gases. 3. Heavy crude oils are very thick and viscous and are difficult or impossible to produce. 4. Less valuable are sour crude oils that contain sulfur. 5. There must be a source rock in the subsurface of the area. 6. The uppermost crust of the earth in oil- and gas producing areas is composed of sedimentary rock layers. 7. Sedimentary rocks are the source and reservoir rocks for gas and oil. 8. The sedimentary rocks that make up the earth's crust are millions and sometimes billions of years old. 9. During the vast expanse of geological time, sea level has not been constant. 10. During these times, sediments were deposited.

Exercise 2. Match the headings (a-d) with the paragraphs (1-4)

- a) The structure of the earth's crust in oil- and gas producing areas.
- b) Sediments and their changing.
- c) Types of crude oil and natural gas.
- d) The main geological conditions for having a commercial deposit.

Exercise 3. Write true (T), false (F) or not given (NG).

- 1. The structure of heavy crude oils prevents them to be produced.
- 2. As different types of crude oils and natural gases are very valuable they are extracted all over the world.
- 3. Existence of a source rock is the final geological condition of having a commercial deposit of gas or oil.
- 4. Sedimentary rock layers are rich in gas and oil.

5. Tides had a great impact on the formation of sediments.
6. Piled layers prevent sedimentary rocks to be formed.

Exercise 4. Answer the following questions.

1. What is the difference heavy crude and light crude oils?
2. What geological conditions must have been met to have a commercial deposit of gas or oil?
3. What rocks are called sedimentary rocks?
4. What are sediments composed of?
5. What is the role of tides in the formation of sediments?



Speaking. Work in group and discuss the following questions.

What are the main products of crude oil? How are they used by people?



Writing. Answer the following questions in written form.

Has oil been used by the mankind only in the last two centuries? If not\yes, develop your idea with examples.



Listen.



180613-fossil-fuels.mp3

1. given a _____ warning
2. the pontiff _____ the oil companies to switch
3. _____ energies

4. a major _____ in climate change
5. a challenge of "epochal _____ "
6. the challenge of energy _____
7. one of the _____ challenges
8. _____ our overall quality of life
9. a contributor to _____
10. _____ conflicts
11. destroy social _____
12. destroy _____

Pope Francis gave a warning to 50 top oil company executives about the dangers of fossil fuels. At a private meeting on Saturday, he asked oil companies to switch to renewable energies for the sake of our planet. He said global warming represented a challenge of "epochal proportions". He said companies must act and that there was no time to lose. He warned that: "With each month that passes, the challenge of energy transition becomes more pressing."

Pope Francis explained the importance of greener energy. He said: "The energy question has become one of the principal challenges...facing the international community. The way we meet this challenge will determine our overall quality of life." Francis said fossil fuels led to poverty and war and could either cause more wars or prevent them. He added: "Clean energy is a duty that we owe towards generations yet to come."

TESTS FOR PROGRESS CHECK ON UNIT I

1. Choose the correct answer. What is the main product of crude oil?

- A) It is gasoline.
- B) It is black liquid.

C) It is a petrochemical.

D) It is carbon.

2. Choose the correct answer. The oil ... for heating is another product of petroleum.

A) using

B) used

C) is used

D) uses

3. Choose the correct answer. What elements is crude oil made up?

A) It is made up of petrochemicals.

B) It is made up of paints, cleaners and waxes.

C) It is made up of hydrogen and carbon.

D) It is made up of hundreds of other things.

4. Choose the correct answer. Oil from one area is often quite different ... that found ... another.

A) at/in

B) from/on

C) in/from

D) from/in

5. Choose the correct definition of the given word. Petroleum

A) a liquid made from petroleum and used especially as a fuel for engines

B) a chemical isolated or derived from petroleum or natural gas

C) a hard black material that is made by burning wood with a small amount of air

D) a rock that is formed chiefly by accumulation of organic remains

6. Choose the correct answer. What was the name of the first modern man to drill for oil?

A) His name was Folly.

B) His name was Nick.

C) His name was Drake.

D) His name was Bill.

7. Choose the correct answer. Why was nobody much interested in producing oil in large quantities up to middle 1800's?

- A) Because there was no great need for it.
- B) Because there was not many means of transport then.
- C) Because there was of it under the ground.
- D) Because there was no necessary technology.

8. Choose the correct answer. What was oil used for in early times?

- A) It was used as a medicine to cure leprosy, rheumatism, and toothache.
- B) It was used to oil chariot wheels.
- C) It was used to wrap around mummies in pitch.
- D) It was used as a lamp oil.

9. Choose the correct answer. Until the middle of 1800's, however, very few people ... or ... oil.

- A) want/need
- B) wanted/needed
- C) want/needed
- D) had wanted/needed

10. Choose the correct definition of the given word. brine

- A) a flammable hydrocarbon *oil* used as fuel in *lamps* and heaters
- B) oil obtained from the blubber of whales
- C) water saturated or strongly impregnated with common salt
- D) a circular frame of hard material

11. Choose the correct answer. How are gases subdivided into natural and artificial?

- A) According to their structure.
- B) According to their location under the ground.
- C) According to their obtaining and physical and chemical properties.
- D) According to their chemical reactions.

12. Choose the correct answer. ... chemically made of two or more elements.

- A) Elemental gases

- B) Compound gases
- C) Artificial gases
- D) Natural gases

13. Choose the correct answer. The artificial gases are those which ... by chemical reactions.

- A) are synthesized
- B) was synthesized
- C) are synthesizing
- D) synthesize

14. Choose the correct answer. ... turn some of them are harmful ... the nature.

- A) On/for
- B) At/to
- C) From/for
- D) In/to

15. Choose the correct definition of the given word. anesthetics

- A) flammable gas, consisting largely of methane and other hydrocarbons
- B) a substance that induces insensitivity to pain
- C) a material made up of two or more different substances
- D) chemical compounds that include an element from the noble gases

16. Choose the correct antonym to the underlined words. Light crude oils are very fluid and relatively easy to produce.

- A) viscous/difficult
- B) thick/viscous
- C) solid/difficult
- D) valuable/heavy

17. Choose the correct answer. How were sediments deposited?

- A) Because they are millions and sometimes billions of years old.
- B) Because the uppermost crust of the earth in oil- and gas producing areas is composed of sedimentary rock layers.

C) It was the result of the fact that during the vast expanse of geological time, sea level has not been constant.

D) It was the result of the fact that the seas have risen to cover the land and then fallen to expose the land many times in the past.

18. Choose the correct answer. What is the similarity of crude oil and natural gas?

A) They both are mixtures of molecules formed by carbon and hydrogen atoms.

B) They both are very fluid and easy to produce.

C) They both are very thick and viscous.

D) They both are difficult or impossible to produce.

19. Choose the correct answer. How many geological conditions must have been met to have a commercial deposit of gas or oil?

A) One.

B) Three.

C) Four.

D) Ten.

20. Choose the correct definition of the given phrase. crude oil

A) a rock in which petroleum has originated

B) a colourless poisonous gas with a smell of bad eggs

C) unrefined petroleum

D) a yellow combustible non-metal

Unit II. Oil and gas exploration and drilling.

Lesson 1. Discovering an Oil Field



Read the text. Discovering an oil field

1. Since 1850, the search for oil has been endless. Generally, there is nothing above ground which can show exactly where oil might lie below. The oil explorer today has to be a detective tracking down all the clues science can give him. He is

helped by many different teams of experts, but the decision to drill is still a big risk. Do you know what are the people who try to determine where oil may be found? Can you explain what makes oil exploration a risky business?

2. The people who try to determine where oil may be found are called geologists. They try to unlock the secrets beneath the earth's surface by studying the formation of rock strata. They have learned a good deal about where oil is not and somewhat less about where it is. They know that three things must exist fairly close together beneath the earth's surface at any place where oil is likely to be found.

3. First, there must be a bed of what once was undersea mud in which bodies of billions of sea creatures had perished. The geologist detects this bed by the shells and skeletons left imbedded in the rock.

4. Second, a layer of porous rock - sandstone, limestone, or dolomite - must be near enough so that oil, forced by water pressure, can enter the pores. Unless it is blocked by something, oil may travel a long way through the porous rock, called oil sand. It may even spread out.

5. In the third place, the layer of oil sand must be surrounded by a layer of dense rock through which the oil can't be squeezed no matter how high the water pressure is. Try to imagine, if you can, making a huge jelly sandwich by squeezing runny jelly into six or seven layers of unevenly cut bread; parts of the bread soft, and parts hard and crusty. If, when you finished, you cut off a slice, you would see, that the jelly was in uneven spots here and there, throughout the whole sandwich. Some would have soaked into the soft bread up to where it was stopped by the crusty parts. Oil is caught in traps underground in somewhat this same way. It soaks into the soft rock, and is stopped by hard layers. Traps are what oil explorers try to find. This formation which blocks the oil and keeps it from travelling any farther, may be an anticline, a fault, or a stratigraphic trap. An anticline is a place where the earth's crust was once pushed up to form an arch. This arch may now be buried far below the earth's surface. Oil travelling along a sandstone stratum flows to the top of the arch. There it is imprisoned by water

pressure from below, and there it will stay forever, until a driller can find and tap it.

6. A fault is a place where the earth's crust has slipped, breaking the layers of underground rock. Thus a layer of dense rock may have been pushed up or down, blocking a layer of sandstone. When the oil seeping through the sandstone reaches the rock layer it finds a dead end. Unable to move ahead because of the hard rock, it cannot move back because of water pressure behind it. So a pool is formed. A stratigraphic trap is a formation of two layers of dense rock separated by a layer sandstone, like a sandwich. Somewhere the two layers of hard rock pinch together and keep the oil in the sandstone from going farther. This also forms an oil pool.



Vocabulary. Match the words 1-14 with their definitions a-n.

- | | |
|-----------------|---|
| 1. explorer | a. to bore or drive a hole in |
| 2. track down | b. a scientist who studies the solid, liquid, and gaseous matter that constitutes the Earth and other terrestrial planets, as well as the processes that shape them |
| 3. drill | c. mud from the sea |
| 4. exploration | d. to enclose closely in or as if in a matrix |
| 5. geologist | e. sedimentary rocks often contain small holes called pores which can contain water or other fluids |
| 6. rock strata | f. a sheet, quantity, or thickness of material, typically one of several, covering a surface or body |
| 7. undersea mud | g. to lie immersed in liquid (such as water): become saturated by or as if by immersion |
| 8. imbed | h. an arch of stratified rock in which the layers |

	bend downward in opposite directions from the crest
9.porous rock	i. a person who explores a new or unfamiliar area
10.layer	j. a natural reservoir in which oil or gas may be confined because of changes in porosity and permeability of the strata rather than as a result of their structural attitudes
11.soak	k. the accumulation of oil in the pores of sedimentary rock that yields petroleum on drilling
12.anticline	l. the act or an instance of exploring
13.stratigraphic trap	m.a layer or a series of layers of rock in the ground
14.oil pool	n. to search for someone or something, often when it is difficult to find that person or thing

Activity 1. Learn the vocabulary above and use them in your speech.

Reading comprehension

Exercise 1. Give the definitions of the underlined words and word combinations.

1. Since 1850, the search for oil has been endless. 2. The oil explorer today has to be a detective tracking down all the clues science can give him. 3. The decision to drill is still a big risk. 4. There must be a bed of what once was undersea mud in which bodies of billions of sea creatures had perished. 5. Oil may travel a long way through the porous rock, called oil sand. 6. Oil travelling along a sandstone stratum flows to the top of the arch. 7. When the oil seeping through the sandstone reaches the rock layer it finds a dead end. 8. Somewhere the two layers of hard rock pinch together and keep the oil in the sandstone from going farther.

Exercise 2. Match the headings (a-f) with the paragraphs (1-6)

- a) The main thing that prevents oil to travel a long way.
- b) The most important thing that helps geologists determine the location of oil.
- c) The role of oil sand in finding petroleum.
- d) The hardships in oil exploration and drilling.
- e) Formation of oil traps.
- f) The work of geologists.

Exercise 3. Write true (T), false (F) or not given (NG).

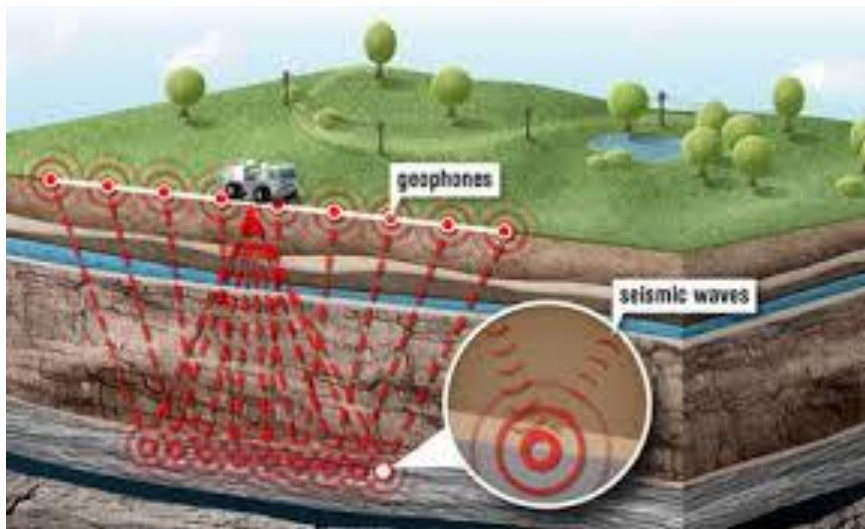
- 1. There are a lot of things that make oil exploration a hazardous business.
- 2. Geologists study a lot to find the ways of exploration.
- 3. The existence of the bed of the former undersea mud is not important in finding oil traps.
- 4. Water pressure is necessary to drive oil in pores.
- 5. One can study the structure of rocks by making jelly sandwiches.
- 6. Water pressure has an important part in the formation of oil traps.
- 7. A fault doesn't break the layers of an underground rock.
- 8. Layer sandstone exists in a stratigraphic trap.

Exercise 4. Answer the following questions.

- 1. Why does the oil explorer have to be a detective today?
- 2. What is the task of geologists?
- 3. What is the first thing that shows the existence of oil?
- 4. What is the role of pores in oil's being caught in traps?
- 5. Why does the author compare a dense rock with a jelly sandwich?
- 6. What is a stratigraphic trap?
- 7. How is an oil pool formed?



Speaking. Work in group. Look at the picture and discuss the usage of seismic technologies in oil and gas exploration.



Writing. Answer the following question in written form.

How was the greatest problem for oilmen in the 19-th century — the caving-in of wells — solved?



Listen. Fill in the gaps.



050526-caspian.mp3

A \$4 billion oil pipeline _____ from the Caspian Sea to the Mediterranean Sea has been opened ten years after construction started. The presidents of Azerbaijan, Georgia, Kazakhstan and Turkey attended the official opening ceremony near Baku, the Azerbaijan capital, _____ brighter economic future for their nations. Revenues from the pipeline are expected to _____ for local economies. A letter from US President George W. Bush fully backing the pipeline was read at the ceremony. It stated: “The US has consistently supported [the pipeline] because we believe in the project’s ability to _____, strengthen participating countries’ energy diversity, _____, and expand international investment opportunities.”

The pipeline is the first direct link _____ Caspian Sea to the Mediterranean. Its construction represents a diplomatic as well as a technological achievement. Oil _____ 1,760 km, from Baku in Azerbaijan, to Ceyhan in Turkey, linking the world's third largest oil and gas reserves to the shipping distribution ports on Turkey's coast. It will _____ Europe and America on Middle Eastern oil. The grip Iran and the Soviet Union once had on the Caspian Sea during the Cold War era collapsed with the fall of communism. New _____ and now neither Iran nor Russia has any share of the lucrative pipeline. Instead, British Petroleum has a 30 per cent stake in it.

PHRASE MATCHING: Match the following phrases from the article (sometimes more than one combination is possible):

- | | |
|---------------------|-------------------------------------|
| a. pump | boost for local economies |
| b. amid | the dependence of Europe |
| c. major | hopes of a brighter economic future |
| d. fully | Caspian Sea |
| e. enhance | lucrative pipeline |
| f. the landlocked | oil |
| g. oil and gas | regional co-operation |
| h. reduce | stake in it |
| i. any share of the | backing the pipeline |
| j. a 30 percent | reserves |

Lesson 2. Well drilling



Read the text. Drilling Well

After the geologists and geophysicists have decided where there is likely to be oil, the actual drilling can begin. The exact place is picked to spud in the well, that

is to begin drilling. Thus begins one of the biggest, most exciting, and most expensive gambling games in the world today. Have the geologist been right, will the drilling produce oil, will all the money invested in the well return the investment, or will it be a total loss? When the site for the well is chosen, the engineers must decide which of two methods of drilling should be used. There are two different ways of drilling a well; one is to use the cable-tool rig and the other — the rotary-drill rig. Both need a derrick, an engine, storage tanks, and piping above ground; otherwise they differ.

Cable-Tool Drilling

The cable-tool method was the earliest use; now it is employed only where the oil sands are not very deep or when there isn't much hard-rock drilling. It is cheaper than rotary drilling, because the hole doesn't need to be lined all the way down with expensive steel pipe as is the case with the rotary-drill hole.

In cable-tool drilling, a bit on the end of a heavy drill stem suspended from a wire cable is raised and allowed to fall so that bit pounds and crushes the rock at the bottom of the well. Each time it falls it grinds its way down deeper. The up-and-down motion of the drill stem is achieved by hooking the wire cable from which it hangs to a walking beam. A crank on a wheel rocks the beam up and down. From time to time the tools are raised from the hole by a cable wound around a bull wheel, for sharpening. While the tools are out, the well is flushed out, and a bailer is dropped down to remove the drilling chips and sludge. If the well passes through beds of soft sand or mud is likely to cave in, sections of steel pipe or casing, are lowered into it as a lining to keep the hole from flooding or caving.

Rotary Drilling

Today most wells are drilled by the rotary method, invented in the 1890's. In hard rock and in very deep wells, rotary drilling works better than cable-tool drilling. In the rotary method, a "string" of drill pipe -that is, sections of steel pipe screwed together by an augur bit at the lower end - is lowered into the hole. The top end of this drill-pipe string is coupled to the lower end of a heavy steel bar called the grief stem or kelly. The grief stem runs through a hole in the middle of a heavy steel turntable or rotary table to a swivel block that hangs from the crown block high up in the derricks. When the driller is ready, the engineer starts the engine, a belt or chain drive from it turns the rotary table, and the grief stem/kelly and drill pipe also begin to revolve. The drill bit in the bottom of the hole revolves too, and the sharp teeth chew through the rock.



Vocabulary. Match the words 1-24 with their definitions a-y.

- | | |
|-------------------|--|
| 1.geophysicist | a. to begin to drill (an oil well) |
| 2.actual drilling | b. the equipment used for drilling in most wells,
which includes an engine and a hoisting, rotating
and mud circulating system |
| 3.spud | c. a quantity or system of pipes |

4.gambling game	d. a lever that oscillates on a pivot and transmits power in a manner producing a reciprocating or reversible motion; used in rock drilling and oil well pumping
5.cable-tool drilling rig	e. a device used to bail out a boat
6.rotary-drill rig	f. a bent part of an axle or shaft or an arm keyed at right angles to the end of a shaft by which circular motion is imparted to or received from the shaft or by which reciprocating motion is changed into circular motion or vice versa
7.derrick	g.a geophysicist is someone who studies or specializes in geophysics
8.piping	h.a muddy or slushy mass, deposit, or sediment
9.cable-tool method	i.a wood-boring bit shaped like an auger but without a handle, one end of which usually has a square tang to fit the chuck of a brace
10.suspended	j.a tube or rod of square cross section fitted into a square hole in the rotary-drill table and forming the top section of the rotary-drill shaft in an oil well
11.drill stem	k.a circular revolving platform for turning a railway locomotive or other vehicle
12.walking beam	l. the act of playing for stakes in the hope of winning (including the payment of a price for a chance to win a prize)
13.crank	m.is part of the drill string, and is a six-sided or four-sided piece of pipe that fits tightly into the bushing which is fitted in the rotary table, and rotates the drill bit.
14.a bull wheel	n.a precision work positioning device used in metalworking

15.bailer	o.a method of boring with a tool of the set used in rope drilling
16.sludge	q.a timber or steel pulley support connecting at the top the derrick posts of an oil well
17.auger bit	r. to cause to go round in an orbit
18.grief stem	s.a derrick which is now replaced by rotary rig.
19.kelly	t.a device joining two parts so that one or both can pivot freely (as on a bolt or pin)
20.turntable	u.a hoisting apparatus employing a tackle rigged at the end of a beam
21.rotary table	v.the string of drill pipe that transmits power from the surface down to the drill bit in well drilling
22.swivel	w. a drum on which a rope is wound for hauling or lifting something (such as logs or well-boring tools)
23.crown block	x.to hang so as to be free on all sides except at the point of support
24.revolve	y.means spudding in a well on the Leased Premises and continuing diligent drilling practices to the Minimum Depth

Activity 1. Learn the vocabulary above and use them in your speech.

Reading comprehension

Exercise 1. Give the definitions of the underlined words and word combinations.

1. After the geologists and geophysicists have decided where there is likely to be oil, the actual drilling can begin. 2. The exact place is picked to spud in the well. 3. Will the drilling produce oil? 4. There are two different ways of drilling a well. 5. One is to use the cable-tool rig. 6. Both need a derrick, an engine, storage tanks, and piping above ground. 7. It is cheaper than rotary drilling. 8. Each time

it falls it grinds its way down deeper. 9. The top end of this drill-pipe string is coupled to the lower end of a heavy steel bar called the grief stem or kelly. 10. The grief stem runs through a hole in the middle of a heavy steel turntable or rotary table.

Exercise 2. Write true (T), false (F) or not given (NG).

1. The geologists and geophysicists can begin drilling at any time.
2. Geologists and geophysicists like to play expensive gambling games.
3. Engineers choose the necessary method of drilling when the site for the well is chosen.
4. A derrick is necessary for the both ways of drilling a well.
5. Unless one of the ways of drilling a well has a derrick, an engine, storage tanks, and piping above ground, they differ.
6. The cable-tool method does not work well when there is much hard-rock drilling.
7. If the hole needed to be lined all the way down with expensive steel pipe, the cable-tool drilling were more expensive.
8. The main function of a bailer is to remove the drilling chips and sludge.

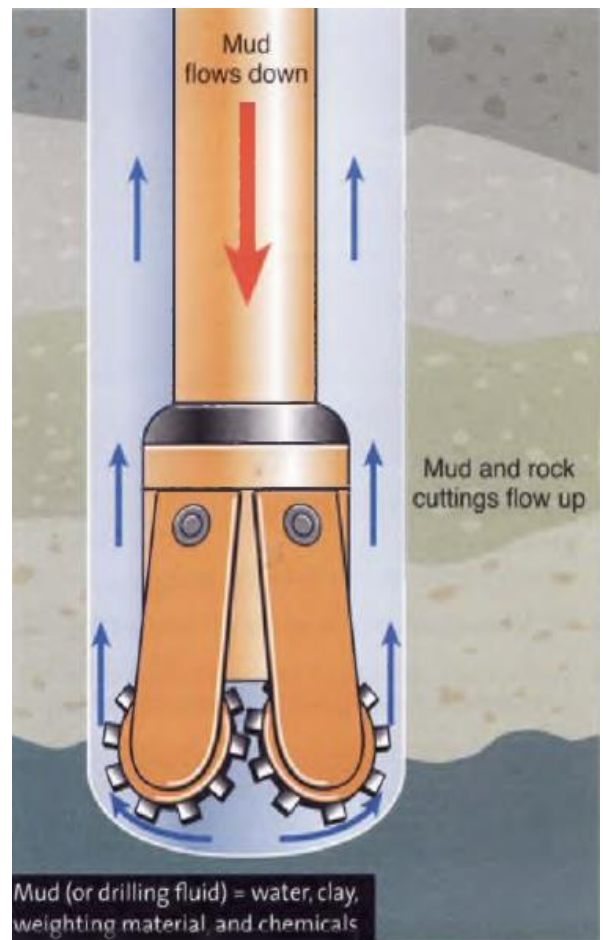
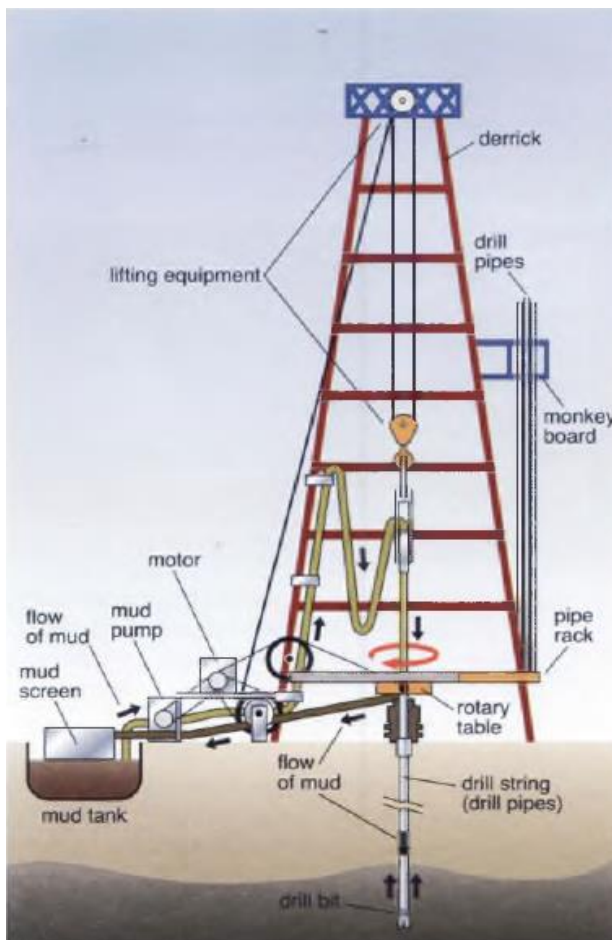
Exercise 3. Answer the following questions.

1. When can the actual drilling begin?
2. When do the engineers decide which method to use?
3. What ways of drilling a well are there?
4. When is it convenient to use the cable-tool method?
5. What is the function of a bit in cable-tool drilling?
6. Where does rotary drilling work better and why?
7. What is grief stem or kelly?



Listening. 1. Complete the description of the mud process. Use words from the diagrams.

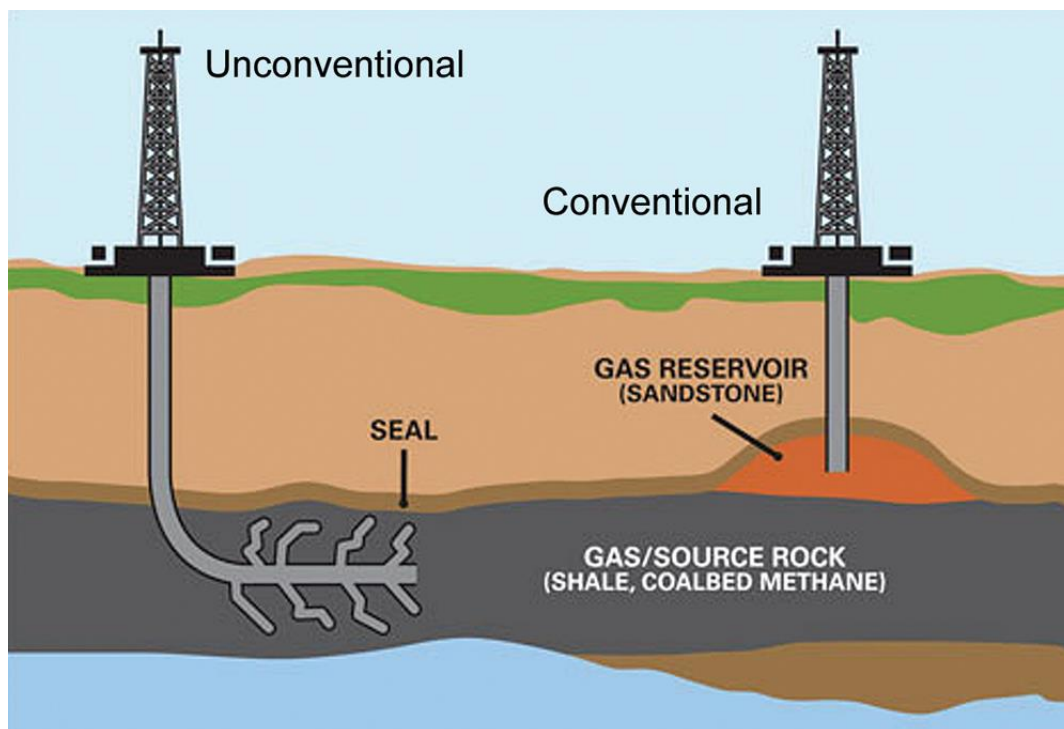
Drilling mud is a mixture of water, clay and other materials. The _____ (1) pumps mud from the _____ (2) into the top of the drill string. The mud flows down inside the _____ (3) to the bit. It cleans and cools the _____ (4). Then it flows up the hole and carries _____ (5) up with it. The mud and cuttings go to the _____ (6). The mud screen separates the cuttings from the mud. The mud flows through to the _____ (7) below.



2. Listen and check your answers above.



Speaking. Work in group. Look at the picture, discuss and find out the difference between the conventional and unconventional oil rigs.



Writing. Answer the following question in written form.

Why has the demand for petroleum increased greatly since the invention of the internal-combustion engine?

Lesson 3. Natural Gas Exploration



Read the text. Natural Gas Exploration

The practice of locating natural gas and petroleum deposits has been transformed dramatically in the last 20 years with the advent of extremely advanced, ingenious technology. In the early days of the industry, the only way of locating underground petroleum and natural gas deposits was to search for surface evidence of

these underground formations. Those searching for natural gas deposits were forced to scour the earth, looking for seepages of oil or gas emitted from underground before they had any clue that there were deposits underneath. However, because such a low proportion of petroleum and natural gas deposits actually seep to the surface, this made for a very inefficient and difficult exploration process. As the demand for fossil fuel energy has increased dramatically over the past years, so has the necessity for more accurate methods of locating these deposits.

Exploration for natural gas typically begins with geologists examining the surface structure of the earth, and determining areas where it is geologically likely that petroleum or gas deposits might exist. It was discovered in the mid 1800s that 'anticlinal slopes' had a particularly increased chance of containing petroleum or gas deposits. These anticlinal slopes are areas where the earth has folded up on itself, forming the dome shape that is characteristic of a great number of reservoirs. By surveying and mapping the surface and sub-surface characteristics of a certain area, the geologist can extrapolate which areas are most likely to contain a petroleum or natural gas reservoir. The geologist has many tools at his disposal to do so, from the outcroppings of rocks on the surface or in valleys and gorges, to the geologic information attained from the rock cuttings and samples obtained from the digging of irrigation ditches, water wells, and other oil and gas wells. This information is all combined to allow the geologist to make inferences as to the fluid content, porosity, permeability, age, and formation sequence of the rocks underneath the surface of a particular area. For example, a geologist may study the outcroppings of rock to gain insight into the geology of the subsurface areas.



Vocabulary. Match the words 1-11 with their definitions a-k.

- | | |
|--------------------|---|
| 1. scour | a. to throw or give off or out |
| 2. seepages of gas | b. the visible or invisible flow of gaseous hydrocarbons from subsurface sources to Earth's surface |
| 3. emit | c. occurring at right angles to the surface or circumference |

	of a plant organ
4.fossil fuel energy	d.to predict by projecting past experience or known data
5.anticlinal	e.a <i>rock</i> formation, a place on the earth where the bedrock underneath shows through
6.extrapolate	f.manmade channels that deliver water to homes, farms, industries and other human uses
7.outcropping of rock	g.the quality or state of being porous
8.irrigation ditches	h.earth material (such as rock) near but not exposed at the surface of the ground
9.porosity	i.a fuel formed by natural processes, such as anaerobic decomposition of buried dead organisms, containing organic molecules originating in ancient photosynthesis that release energy in combustion.
10.subsurface	j.to remove dirt and debris from (something, such as a pipe or ditch)

Activity 1. Learn the vocabulary above and use them in your speech.

Reading comprehension

Exercise 1. Give the definitions of the underlined words and word combinations.

1. The practice of locating natural gas and petroleum deposits has been transformed dramatically in the last 20 years. 2. Those searching for natural gas deposits were forced to scour the earth. 3. Exploration for natural gas typically begins with geologists examining the surface structure of the earth. 4. It was discovered in the mid 1800s that 'anticlinal slopes' had a particularly increased chance of containing petroleum or gas deposits. 5. By surveying and mapping the surface and sub-surface characteristics of a certain area, the geologist can extrapolate which areas are most likely to contain a petroleum or natural gas reservoir. 6. The geologist has many tools at his disposal to do so. 7. This information is all combined to allow the geologist to

make inferences as to the fluid content, porosity, permeability, age, and formation sequence of the rocks. 8. For example, a geologist may study the outcroppings of rock to gain insight into the geology of the subsurface areas.

Exercise 2. Write true (T), false (F) or not given (NG).

1. Due to the advanced, ingenious technology the practice of locating natural gas and petroleum deposits has changed dramatically. 2. In the early days of the industry, underground petroleum and natural gas deposits were explored to form surface formations. 3. People thought up more accurate methods of locating underground deposits to satisfy their need for fossil fuel energy. 4. After the geologists study the earth's surface locating natural gas deposits start. 5. It was discovered in the mid 1800s that 'anticlinal slopes' had a chance of forming petroleum or gas deposits. 6. Where there are anticlinal slopes one area of the earth has laid upon another one. 7. In order to extrapolate which areas are most likely to contain a petroleum or natural gas reservoir geologists conduct surveying and mapping the surface and sub-surface characteristics of a certain area. 8. Information attained from the rock cuttings and samples has no importance for the geologist.

Exercise 3. Answer the following questions.

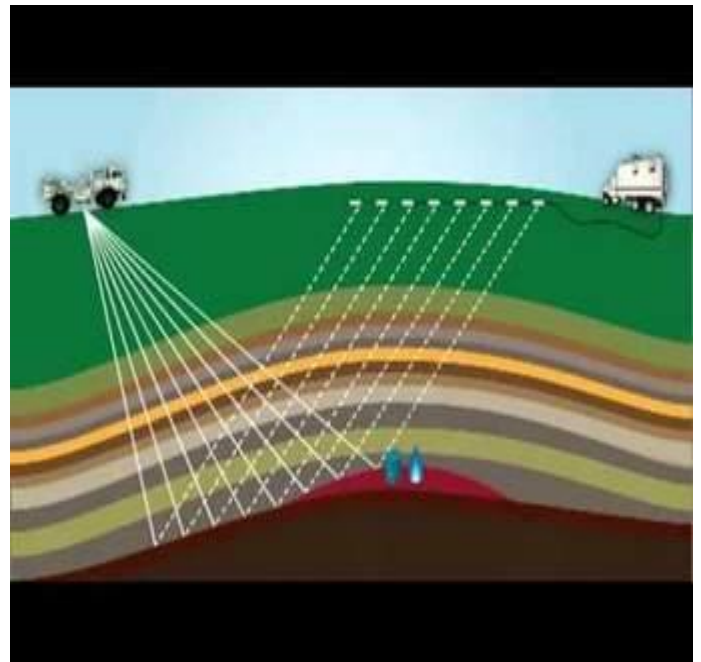
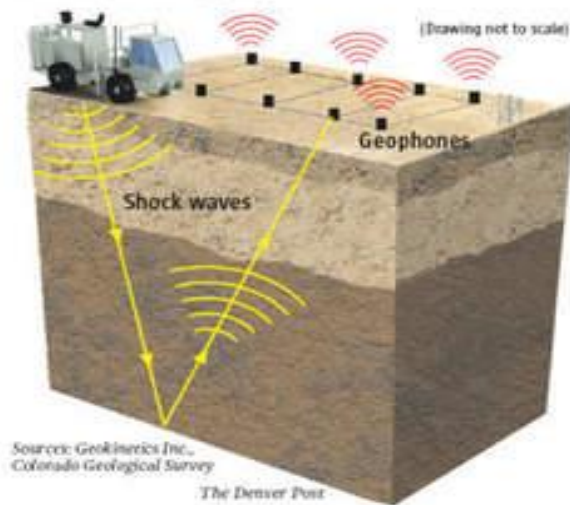
1. How has the practice of locating natural gas and petroleum deposits been changed in the last 20 years? 2. What caused a very inefficient and difficult exploration process in the early days of the industry? 3. What has the necessity for more accurate methods of locating oil and gas deposits resulted from? 4. When does the exploration for natural gas typically begin? 5. What is the role of anticlinal slopes in oil and gas exploration? 6. How can the geologist can extrapolate which areas are most likely to contain a petroleum or natural gas reservoir? 7. What importance has information attained from the rock cuttings and samples for geologists? 8. Why is this information all combined?



Speaking. 1. Work in group. Look at the picture, discuss the function of the trucks and geophones.

Seismic surveying

Seismic surveys are one way drillers search for oil. Large trucks, called "vibrators," shake the ground, sending shock waves deep into the earth. The waves bouncing back are captured by sensors, and signals create a snapshot of the geology.



2. Look at the picture. What do you think this man is doing? Give your own opinion.



3. Role play. Job interview.

INTERVIEWER (Write the questions you want to ask the candidate.)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

INTERVIEWEE (Write questions you want to ask the interviewer.)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____



Writing. 1. Read this essay sample, learn it dividing into parts and define the type of the essay.

Demand for Oil and Gas is Increasing

Fossil fuel consumption is increasing globally. Therefore, some people feel that excavation of fuel should be permitted in unexplored areas. I don't support this. In my opinion, our world can't handle any more pollution and diseases. So, searching for other cleaner sources of power is more vital and crucial.

A good reason protect unexplored lands is that the current oil and gas usage increases global warming. In other words, global temperatures are rising gradually due to the excessive use of fossil fuel. As a result, mankind faces the threat of extinction. Moreover, if we do not stop the exploitation of our natural resources, the green areas that form the lungs of our earth will shrink even further. This will also affect our health. In addition to that, diseases will spread more quickly and affect more people because of the emission of poisonous gases and other contaminants from factories. Another point to consider is that undiscovered land should be protected from industrial activities.

As we can see, excessive dependence on fossil fuels is causing serious damage to our planet. Developing green power technologies is the only solution to this problem. These technologies can also decrease the negative effects of contaminated vapors and gases produced by the overuse of fossil fuel. For instance, in Germany

almost all car factories run on green power. Such technologies maintain better environmental conditions and in the long term they will also prove to be cheaper than conventional sources. This, in turn, will reduce the cost of manufacturing and make goods and products cheaper and more affordable.

In conclusion, fossil fuels are useful; however, they also have negative impacts on the environment. Therefore, I am convinced that instead of exploring undiscovered lands for more oil and gas, we should invest in green power technologies.

Exercise 2. Match the words to make phrases and make up sentences with them.

- | | |
|----------------|---------------|
| a. petroleum | 1. process |
| b. ingenious | 2. structure |
| c. underground | 3. slopes |
| d. exploration | 4. shape |
| e. surface | 5. ditches |
| f. anticlinal | 6. formations |
| g. dome | 7. deposits |
| h. irrigation | 8. technology |

Exercise 3. Answer the following question in written form.

1. What is the role of anticlinal slopes in oil and gas exploration?
2. What importance has information attained from the rock cuttings and samples for geologists?



Listen. 1. Listen and fill in the gaps.



shell.mp3

Royal Dutch Shell, _____ Shell, is an Anglo-Dutch petroleum company. It is one of the _____, natural gas, and petroleum companies in the world and was listed as the _____ in 2010. Shell was created in 1907 when

Holland's Royal Dutch Petroleum Company and Britain's "Shell" Transport and Trading Company merged. Its _____ shell logo is one _____ on the planet. The company website says: "We are a global group of energy and petrochemicals companies with around 101,000 employees in more than _____. Our innovative _____ ready to help tackle the challenges _____ e." Shell produces 2% of the world's oil and 3% of gas. It has 44,000 service stations worldwide.

2. Write anything about Shell for 10 minutes. Show your partner your paper. Correct each other's work.

Lesson 4. How does natural gas drilling work?



Read the text. How does natural gas drilling work?

1. When you switch on your furnace or turn on your gas stove and use the heat from that little blue flame, you're doing what people in 62 million other American homes do every day, too: you're using natural gas. While natural gas is one way we can heat our homes, cook our food or even power some of our cars and buses, like all sources of energy, it has to come from somewhere. Here's how natural gas drilling works.
2. Like all forms of energy drilling, natural gas drilling starts when a deposit of natural gas is found deep beneath the Earth's surface. To find these deposits, energy company scientists use a variety of methods. They look at the surface geology of an area, the seismic energy (how energy moves from inside the Earth to its surface) and

even the magnetic properties of the underground rock formations. Once a likely deposit of natural gas is located, the energy company then drills down to reach it.

3. Of course, getting gas out of the Earth isn't easy. A natural gas well isn't at all like a water well (where you drill a hole in the ground and water fills it). Natural gas tends to be contained within the underground rock itself. The rock must be broken to release the gas. And if it's brought out the wrong way, it can contaminate the groundwater supply surrounding it. To get the most gas possible, after drilling a hole, energy companies line the hole with materials meant to keep the gas in. Next, they send electric charges down the well, which affect the rock around it. After the charges are set off, a highly-pressurized liquid fracking solution is sent down the well. This solution breaks up the rocks, releasing the natural gas. Since the gas is lighter than the fracking solution, it rises to the top of the well for capture.

4. While this sounds easy enough, there are still some controversies surrounding natural gas drilling. Some people argue that it releases dangerous chemicals into the groundwater, and can contaminate drinking and agricultural water supplies. Also, once the fracking solution has been used, it's filled with toxic chemicals. Sometimes it can be recycled into things like road deicer, but often times its stored deep underground or taken to wastewater treatment plants.

taken to wastewater treatment plants.



Vocabulary. Match the words 1-18 with their definitions a-k.

- | | |
|-------------|---|
| 1. furnace | a.a natural accumulation (as of iron ore, coal, or gas) |
| 2. liquid | b.a wave of <i>energy</i> that is generated by an earthquake or other earth vibration and that travels within the earth or along its surface |
| 3. drilling | c.the solid mineral material forming part of the surface of the earth and other similar planets, exposed on the surface or underlying the soil. |

4. deposit	d.a chemical mixture used in drilling operations to increase the quantity of hydrocarbons that can be extracted
5. surface geology	e.take into one's possession or control by force.
6. seismic energy	f.a distinct compound or substance, especially one which has been artificially prepared or purified.
7. magnetic property	g.broad group of <i>chemicals</i> capable of causing harm to plants and animals including humans.
8. contaminate	h.prolonged public disagreement or heated discussion.
9. electric charge	i.an enclosed structure in which heat is produced (as for heating a house or for reducing ore)
10.rock	j.A substance, such as rock salt or ethylene glycol, used to melt or prevent the formation of ice, as on roads, windshields, or aircraft wings.
11. fracking fluid	k.a process used to remove contaminants from wastewater or sewage and convert it into an effluent that can be returned to the water cycle with acceptable impact on the environment, or reused for various purposes
12. capture	l.the glowing gaseous part of a fire
13. controversy	m. flowing freely like water
14. chemical	n. the scientific study of the features at the surface of the earth
15. toxic chemicals	o.the response of a material to an applied magnetic field
16. deicer	p.make (something) impure by exposure to or addition of a poisonous or polluting substance.
17. wastewater treatment	q.the action of making a hole in something by boring with a drill.
18. flame	r. basic property of matter carried by some elementary particles that governs how the particles are affected by an <i>electric</i> or magnetic field

Activity 1. Learn the vocabulary above and use them in your speech.

Reading comprehension

Exercise 1. Give the definitions of the underlined words and word combinations.

1. You're using natural gas. 2. Like all forms of energy drilling, natural gas drilling starts when a deposit of natural gas is found deep beneath the Earth's surface. 3. Once a likely deposit of natural gas is located, the energy company then drills down to reach it. 4. A natural gas well isn't at all like a water well. 5. Natural gas tends to be contained within the underground rock itself. 6. This solution breaks up the rocks, releasing the natural gas. 7. Since the gas is lighter than the fracking solution, it rises to the top of the well for capture. 8. Sometimes it can be recycled into things like road deicer.

Exercise 2. Match the headings (a-d) with the paragraphs (1-4)

- a) Natural gas drilling.
- b) Harm of natural gas drilling.
- c) Everyday use of natural gas.
- d) Work before drilling.

Exercise 3. Answer the following questions.

1. What is the role of natural gas in our everyday life? 2. What operations are carried out before natural gas drilling starts? 3. What do energy company scientists do to find the deposits of natural gas located deep beneath the Earth's surface? 4. How is gas drilled properly? 5. Why are electric charges and fracking solution sent down the well? 6. What controversies are there about natural gas drilling?



Speaking. Work in groups. Discuss the following questions.

- 1. What negative effect can natural gas drilling have on the environment?
- 2. How can it be prevented or decreased?



Writing.

Exercise 1. Answer the following question in written form.

1. How is gas drilled properly?
2. What controversies are there about natural gas drilling?

Exercise 2. Match the words to make phrases and make up sentences with them.

- | | |
|-------------|---------------|
| 1. blue | a. flame |
| 2. energy | b. sources |
| 3. drilling | c. works. |
| 4. surface | d. geology |
| 5. seismic | e. energy |
| 6. magnetic | f. properties |
| 7. electric | g. charges |
| 8. fracking | h. solution |



Listen. Match the correct answer.



se-econ-oil-1-22nov07.mp3

1. Petroleum was used in ancient times for making
 - ☐ roads.
 - ☐ cars.
 - ☐ rolls.
2. Petroleum comes from the remains of
 - ☐ ancient times.

- ☐ plants and animals.
 - ☐ dinosaurs and other animals.
3. Oil can also contain a lot of sulfur.
- ☐ True.
 - ☐ False.
 - ☐ The author doesn't say.
4. The modern history of oil started in
- ☐ 1800.
 - ☐ 1850.
 - ☐ 1980.
5. Edwin Drake drilled the first oil well in the US in
- ☐ 1815.
 - ☐ 1829.
 - ☐ 1859.
6. John D. Rockefeller entered the oil business in
- ☐ the early 1816.
 - ☒ the early 1860s.
 - ☐ 1870.
7. The company Standard Oil was divided into
- ☐ 24 companies.
 - ☐ 34 companies.
 - ☐ 54 companies.

TESTS FOR PROGRESS CHECK ON UNIT II

1. Choose the correct answer. Since 1850, the search for oil ... endless.

- A) has been
- B) had been
- C) was
- D) is

2. Choose the correct answer. The people who try to determine where oil may be found are called

- A) roughneck
- B) driller
- C) geologists
- D) explorer

3. Choose the correct answer. What is the first thing that shows the existence of oil?

3. First, The geologist detects this bed by the

- A) There must be shells and skeletons left imbedded in the rock.
- B) There must be a bed of what once was undersea mud in which bodies of billions of sea creatures had perished.
- C) There must be things fairly close together beneath the earth's surface at any place.
- D) There must be a layer of porous rock - sandstone, limestone, or dolomite.

4. Choose the correct answer. What is fault?

- A) It is a sandstone reaching the rock layer.
- B) It is a place where the earth's crust has slipped, breaking the layers of underground rock.
- C) It is a place where two layers of hard rock pinch together and keep the oil in the sandstone.
- D) It is a dense rock blocking a layer of sandstone.

5. Choose the correct definition of the given word. drill

- A) to bore or drive a hole
- B) to lie immersed in liquid
- C) to enclose closely

D) to pump liquids from under the ground

6. Choose the correct answer. When can the actual drilling begin?

A) It begins when the exact place is picked to spud in the well.

B) It begins when the site for the well is chosen.

C) It begins when the geologists are ready to drill.

D) It begins after the geologists and geophysicists have decided where there is likely to be oil.

7. Choose the correct answer. The cable-tool is ... than rotary drilling.

A) cheapest

B) cheap

C) cheaper

D) the cheapest

8. Choose the correct answer. From time to time the tools ... from the hole by a cable wound around a bull wheel.

A) are raised

B) are risen

C) raise

D) have raised

9. Choose the correct answer. Where does rotary drilling work better than cable-tool drilling?

A) Where the well passes through beds of soft sand or mud.

B) In hard rock and in very deep wells.

C) In the hole from flooding or caving.

D) Where the tools are out.

10. Choose the correct definition of the given word. derrick

A) a device used to bail out a boat

B) an equipment used for drilling in most wells

C) a muddy or slushy mass, deposit, or sediment

D) a quantity or system of pipes

11. Choose the correct answer. The practice of locating natural gas and petroleum deposits ... dramatically in the last 20 years

- A) is being transformed
- B) transformed
- C) have been transformed
- D) has been transformed

12. Choose the correct answer. ...the early days of the industry, the only way ... locating underground petroleum and natural gas deposits was to search ... surface evidence of these underground formations.

- A) In/for/of
- B) On/of/of
- C) In/of/for
- D) At/on/for

13. Choose the correct answer. What has been the necessity for more accurate methods of locating petroleum and natural gas deposits?

- A) Because the demand for fossil fuel energy has increased dramatically over the past years.
- B) Because exploration for natural gas typically has begun with geologists examining the surface structure of the earth.
- C) Because the geologists have had many tools at his disposal to do so.
- D) because such a low proportion of deposits actually has seeped to the surface.

14. Choose the correct definition of the given word. subsurface

- A) refers to the earth material near but not exposed at the surface of the ground
- B) refers to the quality or state of being porous
- C) refers to a fuel formed by natural processes
- D) refers to the remove of dirt and debris

15. Choose the correct answer. The geologic information attained from the rock cuttings and samples obtained from the digging of irrigation ditches, water wells, and other oil and gas wells is combined

- A) All are correct

B) to allow the geologist to make inferences as to the fluid content, porosity and permeability of a particular area

C) to allow the geologist to make inferences to the age, and formation sequence of the rocks underneath the surface of a particular area

D) to allow the geologist to make inferences as to the fluid content, porosity, permeability, age, and formation sequence of the rocks underneath the surface of a particular area

16. Choose the correct answer. How do we use natural gas in our everyday life?

A) We heat our homes, cook our food or even power some of our cars and buses.

B) Our geologists pump it out and send us.

C) It is used in a variety of methods.

D) We only heat our homes with it.

17. Choose the correct answer. Like all forms of energy drilling, natural gas drilling ... when a deposit of natural gas ... deep beneath the Earth's surface.

A) start/is founded

B) starts/was found

C) starts/is found

D) has started/has found

18. Choose the correct answer. What do energy company scientists do to find natural gas deposits?

A) They look at the seismic energy.

B) All are correct.

C) They look at the surface geology of an area.

D) They look at the magnetic properties of the underground rock formations.

19. Choose the correct answer. If it's ... out the wrong way, it can ... the groundwater supply surrounding it.

A) brought/contaminate

B) bring/contaminating

C) brought/contaminated

D) bringing/contaminate

20. Choose the correct definition of the given word. contaminate

- A) take into one's possession or control by force
- B) make a hole in something by boring with a drill
- C) make (something) impure by exposure to or addition of a poisonous or polluting substance
- D) prolong public disagreement or heated discussion

Unit 3. Oil and Gas technologies and transportation

Lesson 1. Drilling rigs and equipment for lowering and lifting the boring column



Read the text. Drilling rigs and equipment for lowering and lifting the boring column

The drilling process is accompanied by lowering and lifting the boring column into the well, and keeping it hanging. The weight of an instrument, which has to operate at this, reaches many tens of tons. Lifting equipment, consisting of the rig, drilling hoist and waist polyspast system is used for decreasing the load on the rope and reducing installing capacity of the motor. The waist system, in its term, consists of the unmovable part – crown block (unmovable blocks of polyspast), which is installed on the top of the lantern of the rig on the special frame, and the movable part – waist block (movable block of polyspast), waist rope, hook and others.

The lifting equipment is integral part of any drilling plant irrespective of drilling way.

Drilling rigs, used at drilling wells.

Drilling rig is intended for lifting and lowering the boring column and lowering lined pipes into the well, keeping drilling column hanging at drilling, and for placing waist system, in drilling pipes and a part of the equipment in it that's necessary for

realization of the boring process. Drilling rigs differ by carrying capacity, height and construction.

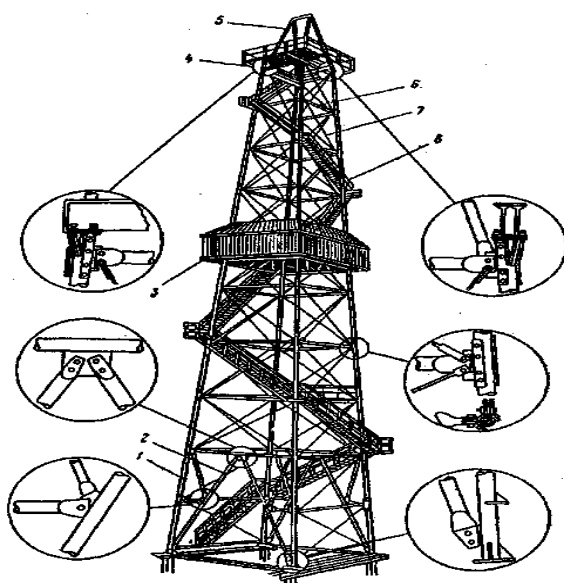
For drilling wells till 4000 m rigs with the height of 41 m are used wells with the depth of more than 4000 m rigs with the height of 53 m and more are used.

By construction rigs are divided into two types: tower and mast. Pic.7

Tower rigs are such rigs, at which the load passes on four bearings. At the rigs of mast type the load passes on one or two bearings.

On the picture the construction of tower type rig with the height of 41 m is shown. This is a tetrahedral truncated pyramid consisting of 10 panels of the height about 4 m each. The lower base of the ring has the size of 8x8 m and the upper one – 2x2 m. Rig's legs are made of boring pipes with the thickness of walls 10 and 11mm . The belts are also made of pipes, but more thin - walled, diagonals are made of round iron with diameter of 19- 22 mm . The legs, belts and diagonals in units are connected by means of special welded half muffers. In the lower part, the legs of the rig have supporting slabs, welded to the pipes by these slabs the rig is fastened to the foundation with the help of bolts.

Pic. 7. Tower drilling rig BM-41: 1 - leg; 2 - gates; 3 - balcony; 4 – under crown block area; 5 – mounting trestle; 6 – crossing belts; 7 – draft stairs.

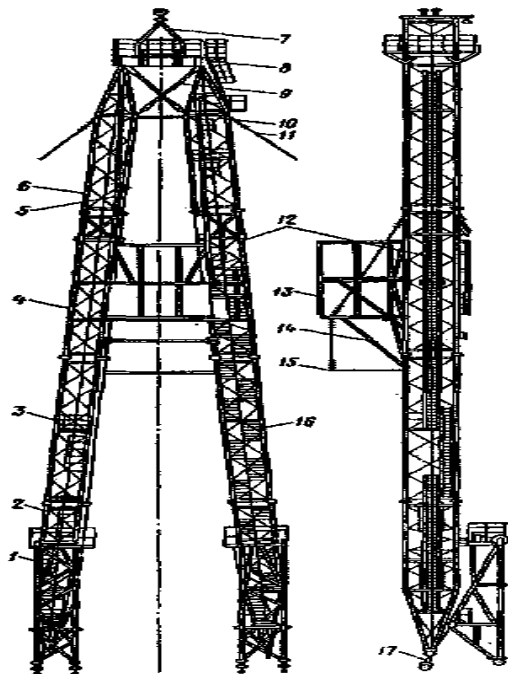


The rigs of mast type (A-shaped rigs) have been used widely lately. Sectional rigs of the mast type (pic 8.) present A-shaped metal construction, consisting of two three or tetrahedral legs and two struts. On the top, the legs are connected among themselves by under crown block frame on which the

crown block is installed. Beneath the rig's legs are fastened into the bearings of rig foundation. Firmness of the rig, in the working state, is provided by the struts and four braces. For avoiding accidental fall of candles of boring pipes, preventive belts are installed on rig. A-Shaped rigs in comparison with tower type rigs have a lot of advantages: for their making less metal is needed, they have fewer number of details, their mounting and dismantling is made easier, conditions of work on getting pipes in boring and out of boring and rounding –up in boring are improving.

Pic. 8. Mast drilling rig A-shaped type:

1 – lifting column; 2, 3, 4, 6 – sections of mast; 5 – fair stairs; 7 – mounting trestles for repair of crown block; 8 – under crown block frame; 9, 10, 14 – tensions; 11 – procrastination; 12 – tunnel stairs; 13 – balcony; 15 – preservative belt; 16 – draft stairs; 17 – hinge.



Vocabulary. Match the words

1-13 with their definitions a-m.

- | | |
|----------------------|--|
| 1. lantern | a. equipment for lifting and lowering loads, and includes any accessories used in doing so (such as attachments to support, fix or anchor the equipment) |
| 2. strut | b. the system used on a drilling rig to perform all lifting activities on the rig |
| 3. capacity | c. the state or condition of being welded |
| 4. lifting equipment | d. A machine consisting of a combination of pulleys, used for raising heavy weights |

- | | |
|--------------------|--|
| 5. rig | e. a timber or steel pulley support connecting at the top the derrick posts of an oil well |
| 6. hoist | f. block with a hook attached used in lifting service. |
| 7. weld | g. a length of thick strong cord made by twisting together strands of hemp, sisal, nylon, or similar material. |
| 8. polyspast | h. a usually portable protective case for a light with transparent openings |
| 9. crown block | i. the process of enlarging a hole that has already been drilled (or cast) by means of a single-point cutting tool |
| 10. block hook | j. a linked series of pipes with pumps and valves for flow control, used to transport crude oil, water, etc., esp. over great distances. |
| 11. lined pipes | k. the maximum amount or number that can be contained or accommodated |
| 12. boring process | l. a device or piece of equipment designed for a particular purpose. |
| 13. rope | m. a structural piece designed to resist pressure in the direction of its length |

Activity 1. Learn the vocabulary above and use them in your speech.

Reading comprehension

Exercise 1. Give the definitions of the underlined words and word combinations.

1. The boring process is accompanied by lowering and lifting the boring column into the well. 2. The lifting equipment is integral part of any boring plant irrespective of boring way. 3. Boring rig is intended for lifting and lowering the boring column and lowering lined pipes into the well. 4. Boring rigs differ by carrying capacity, height

and construction. 5. This is a tetrahedral truncated pyramid consisting of 10 panels of the height about 4 m each. 6. Firmness of the rig, in the working state, is provided by the struts and four braces. 7. For avoiding accidental fall of candles of boring pipes, preventive belts are installed on rig. 8. A-Shaped rigs in comparison with tower type rigs have a lot of advantages.

Exercise 2. Write true (T), false (F) or not given (NG).

1. Lifting equipment, consisting of the rig, boring hoist and waist polystast system is very useful in the drilling process. 2. Any boring plant irrespective of the boring way cannot exist without the lifting equipment. 3. Boring rig is intended for installing lined pipes on the well mouth. 4. According to carrying capacity, height and construction drilling rigs vary. 5. Rig`s legs are made of very thick drilling pipes. 6. Before the rigs of mast type have been more preferable. 7. The crown block of the drilling rig is installed on the under crown block frame. 8. The function of the preventive belts is to prevent casual fall of candles of drilling pipes.

Exercise 3. Answer the following questions.

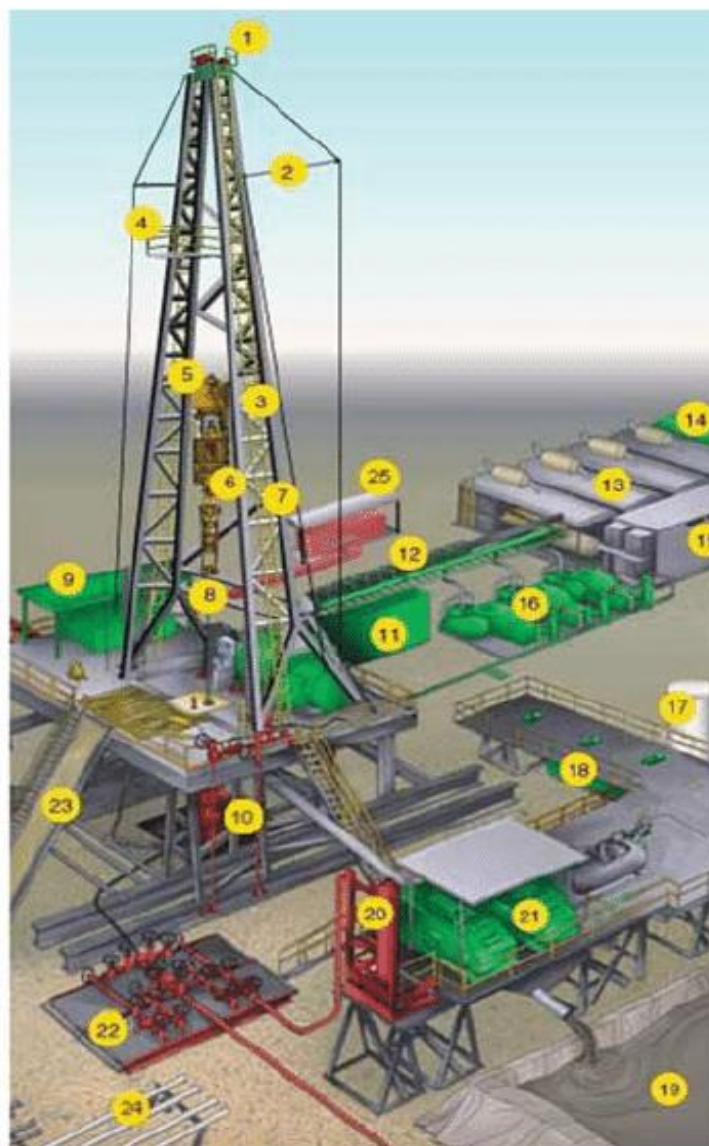
1. What is the function of the lifting equipment? 2. What parts does the waist system consist of? 3. What is the function of a boring rig? 4. What types are drilling rigs divided into by construction? 5. What is the difference between the tower rigs and the mast one? 6. What parts does the tower type rig have? 7. What parts do rigs of mast type have? 8. What is the function of the struts and four braces? 9. What is the function of the preventive belts?



Speaking. Pair work. Look at the picture, discuss and make a dialogue on it. Role play your dialogue.

Drilling Rig Components*

1. Crown Block and Water Table
2. Catline Boom and Hoist Line
3. Drilling Line
4. Monkeyboard
5. Traveling Block
6. Top Drive
7. Mast
8. Drill Pipe
9. Doghouse
10. Blowout Preventer
11. Water Tank
12. Electric Cable Tray
13. Engine Generator Sets
14. Fuel Tanks
15. Electric Control House
16. Mud Pump
17. Bulk Mud Components Storage
18. Mud Pits
19. Reserve Pits
20. Mud Gas Separator
21. Shale Shaker
22. Choke Manifold
23. Pipe Ramp
24. Pipe Racks
25. Accumulator



Equipment used in drilling



Writing. Exercise 1. Write a short information about the picture in the speaking activity.

Exercise 2. Match the words to make phrases and make up situations with them.

- | | |
|--------------|-----------------|
| 1. drilling | a. capacity |
| 2. unmovable | b. pyramid |
| 3. crown | c. slabs |
| 4. integral | d. construction |
| 5. carrying | e. column |
| 6. truncated | f. part |

7. supporting

g. block

8. metal

h. part

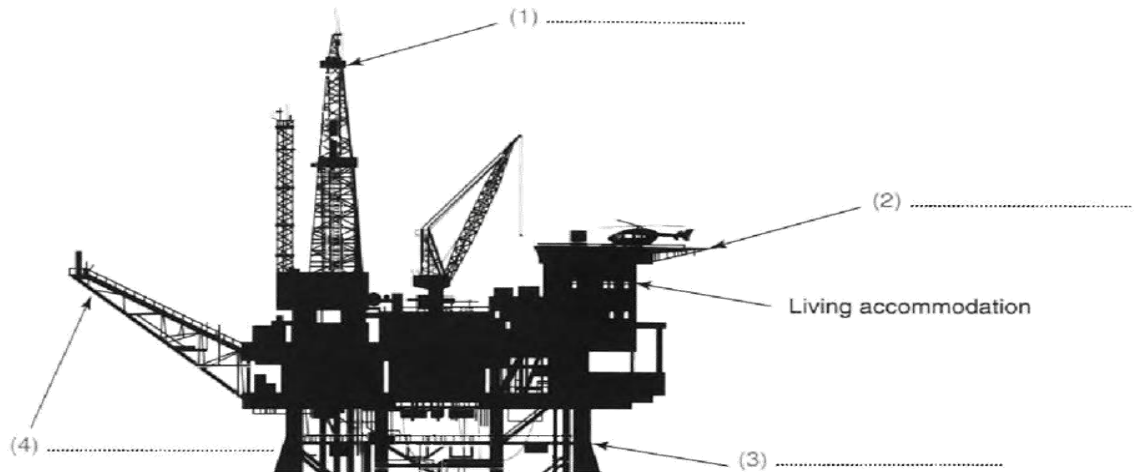


Listen.

Unit 12

34

3 Listen to the talk about the structure of an offshore oil rig and label the diagram.



35

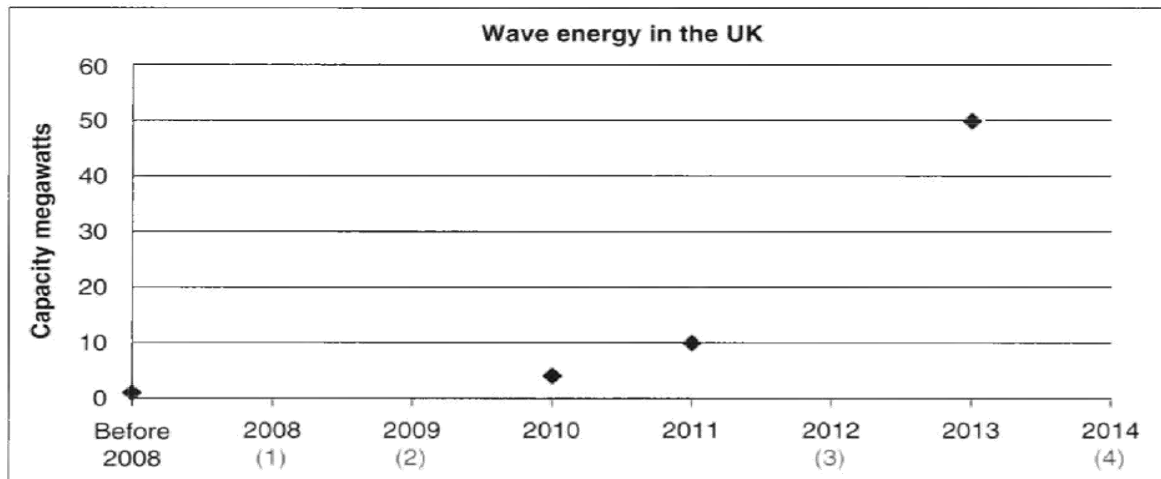
4 You will hear an engineer talking about using the sea to generate electricity. Complete the values for the capacity in megawatts in the years below (1–4). Then plot the points on the graph and draw the trend line.

1 2008

2 2009

3 2012

4 2014



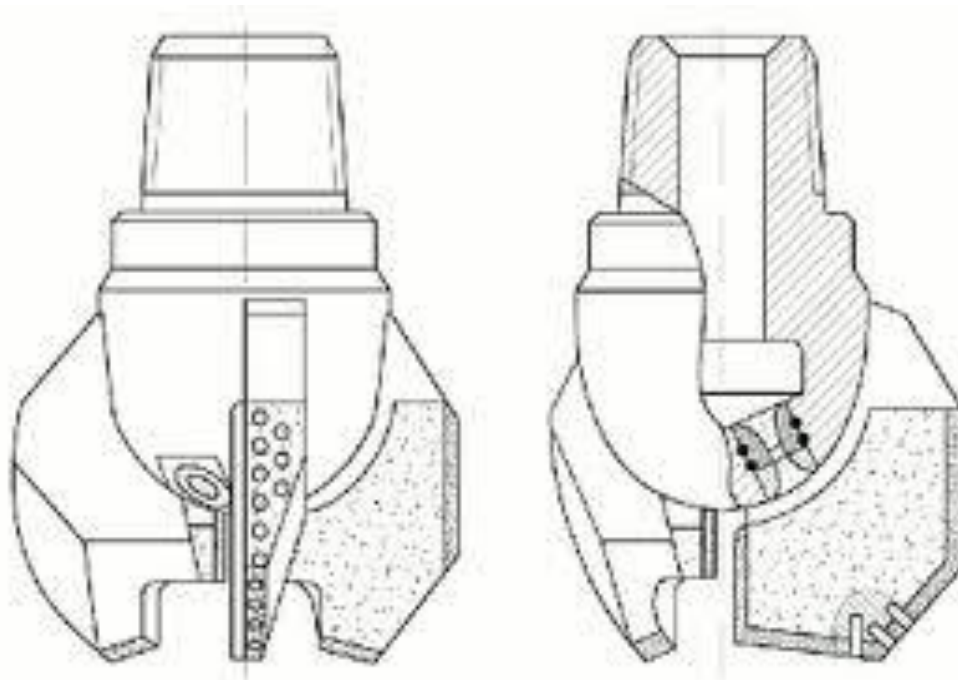
Lesson 2. Function and classification of drilling bits



Read the text. Function and classification of drilling bits

Bits for drilling are instruments, with the help of which rocks are on the face and there appears a well. By characteristics of destructing rocks all drilling bits are classified in the following ways.

1. Bits of cutting and splitting off action destroying the rocks with blades, inclined to the side of rotation of the bit. They are intended for drilling quick (мягкий) rocks.

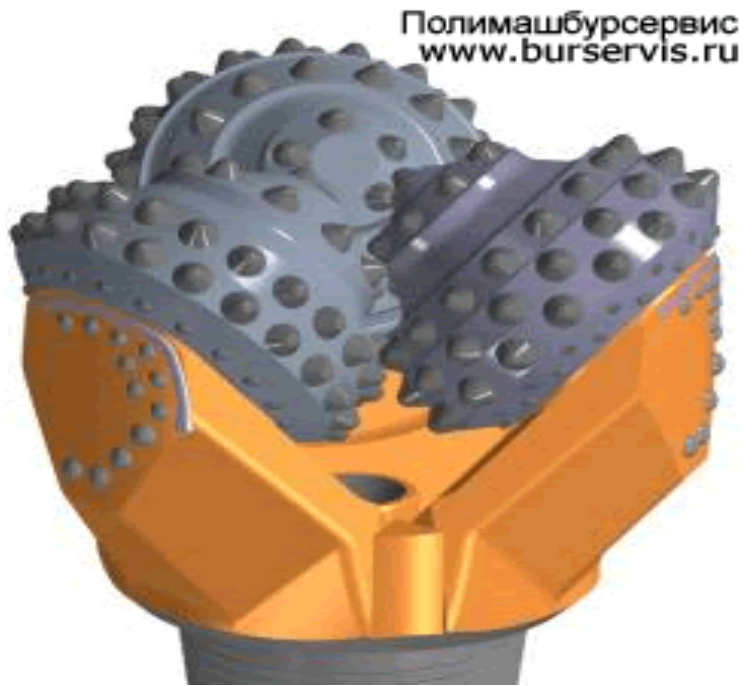


Bits of crushing and splitting off action destroying the rocks with teeth or pins, are located on the balls which rotate around their axle and around the axle of the bit. At rotating the bit besides crushing action on of the teeth (pins) of the balls, sliding through the face of the well, splits (cut) off the rocks, at the expense of which the effectiveness of rocks' destroying is increased. It is necessary to note, that drilling bits and boring heads of only crushing action are produced. At working with these bits,

rocks are destroyed as a result of dynamic influence (stroke) of the teeth of the balls on the face of the well.

Abovementioned bits and boring heads are intended for boring un-abrasive and abrasive rocks of middle hardness, hard, solid and very solid rocks.

2. Bits of reducing and cutting action, destroying rocks with diamond grain or hard alloyed pins, are located in pavement part of the bit or in the edges of the blades of the bit.



Bits with diamond grain and hard alloyed pins in the pavement part are applied for boring un-abrasive rocks of middle hardness and hard rocks; blade bits, reinforced with diamond grains or hard alloyed pins are applied for boring intermittent abrasive

and unabrasive rocks by hardness.

According to the function all boring bits are classified into three classes:

- bits for solid boring , destroying rocks in one plane or in grades.
- boring heads for column boring, destroying rocks by periphery of face;
- bits for special purposes (spade shaped, reamer, cutters and etc.)



Bits for solid boring and boring heads for column boring are intended for deepening the well. They are made of different types which let choose the proper bit.

Bits for special purposes are intended for work in a bored well and surrounded column.

Other types of bits and boring heads (diamond, bits for special purposes and etc.) are produced technical conditions, which are worked out by institutes and plants - manufacturer.

Bits are normalized by diameters irrespective of their function construction and type.



Vocabulary. Match the words 1-10 with their definitions a-j.

- | | |
|----------------------|--|
| 1.Bit blade | a. the solid mineral material forming part of the surface of the earth and other similar planets, exposed on the surface or underlying the soil. |
| 2. boring head | b. (of a substance or material) capable of polishing or cleaning a hard surface by rubbing or grinding |
| 3. dynamic influence | c. a metal made by combining two or more metallic elements, especially to give greater strength or resistance to corrosion. |
| 4. rock | d. a tool or piece for boring or drilling |
| 5. abrasive | e. occurring at irregular intervals; not continuous or steady |
| 6. diamond | f. make (a hole) in something with a tool or by digging |
| 7. alloy | g. a force or factor that controls or influences a process of growth, change, interaction, or activity: a dynamic force or factor |
| 8. pinblade bit | h. the cutting end of a boring tool |
| 9. intermittent | i. a precious stone consisting of a clear and colourless crystalline form of pure carbon, the hardest naturally |

occurring substance.

10. column boring

j. a drilling bit with cutting edges usually hardened against wear

Activity 1. Learn the vocabulary above and use them in your speech.

Reading comprehension

Exercise 1. Give the definitions of the underlined words and word combinations.

1. By characteristics of destructing rocks all drilling bits are classified in the following ways. 2. They are intended for drilling quick rocks. 3. At working with these bits, rocks are destroyed as a result of dynamic influence of the teeth of the balls on the face of the well. 4. Abovementioned bits and boring heads are intended for boring un-abrasive rocks. 5. According to the function all boring bits are classified into three classes. 6. They are made of different types which let choose the proper bit. 7. Bits for special purposes are intended for work in a bored well and surrounded column. 8. Other types of bits and boring heads are produced in technical conditions.

Exercise 2. Write true (T), false (F) or not given (NG).

1. Drilling bits are classified according to the way of their destructing rocks. 2. Bits of cutting and splitting off action are produced for drilling quick (мягкий) rocks. 3. Rocks' destruction is a result of dynamic influence (stroke) of the teeth of the balls on the face of the well while working with bits of crushing and splitting off action. 4. Bits of reducing and cutting action do not have a pavement part. 5. Bits with diamond grain and hard alloyed pins cannot crush hard rocks. 6. Wells are deepened with bits for solid boring and boring heads for column boring. 7. Function construction and type of bits have no importance at normalizing them.

Exercise 3. Answer the following questions.

1. What kind instruments are drilling bits? 2. What are bits of cutting and splitting off action intended for? 3. How do these bits work? 4. What is the role of

dynamic influence (stroke) of the teeth of the balls on the face of the well at working with these bits? 5. How do bits of reducing and cutting action destroy rocks? 6. What are bits with diamond grain and hard alloyed pins in the pavement part applied for? And what about blade bits, reinforced with diamond grains or hard alloyed pins? 7. What classes are all boring bits classified according to the function? 8. What are bits for special purposes intended for?



Speaking. Work in group. Look at the picture, discuss and find out the difference among three bits.

TYPES OF DRILL BITS



MILLED TOOTH BIT
USED FOR CUTTING
OF UPPER LAYER OF
SAND (GENERALLY
UPTO 400-700 m.)



INSERT BIT
USED FOR CUTTING
OF ROCKS AND SAND
(DEPTH UPTO 1200m.)



**POLYCRYSTALLINE
DIAMOND COMPACT
DRILL BIT**
USED FOR CUTTING OF
HARD FORMATION OR
ROCKS (DEPTH 1000m.
AND ABOVE).



Writing. 1. Write about the three bits in the picture above and show their advantages and disadvantages.

2. Match the words to make phrases and make up sentences with them.

- | | |
|-------------|----------|
| 1. diamond | a. rocks |
| 2. pavement | b. heads |
| 3. abrasive | c. grain |

- | | |
|-------------|-----------|
| 4. boring | d. part |
| 5. crushing | e. bits |
| 6. drill | f. action |

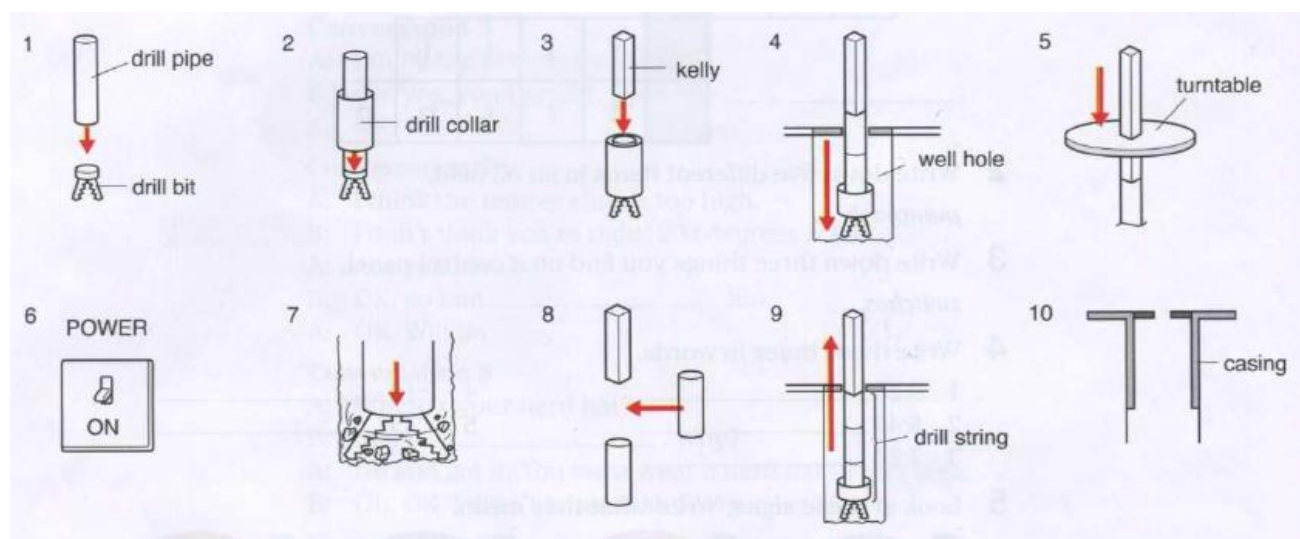


Listen.



32 Track 32.mp3

1. Look at the diagrams. Listen to the instructions about how to drill for oil.



2. Write the correct number next to each verb. Listen again to check.

- | | | | |
|--------------|-------|----------------|----------|
| a) fix | _____ | f) trip out of | _____ |
| b) install | _____ | g) attach | <u>1</u> |
| c) drill | _____ | h) put | _____ |
| d) trip into | _____ | i) turn on | _____ |
| e) slide | _____ | j) attach | _____ |

Lesson 3. Methods of oil and gas transportation.



Read the text. Methods of oil and gas transportation.

1. There are four main methods of transporting oil and gas: pipeline, rail, boat, and road transportation by truck.

2. Pipeline is the most commonly used method for transporting oil and gas. About 70 percent of all domestically produced petroleum products is transported by pipeline. Pipelines are used to transport a number of substances including natural gas, fuels, hydrogen, water, beverages, and petroleum.



3. Oil pipelines are generally divided into two basic sections called trunks and gathering lines. Trunks range in size from 20 to 60 centimeters in diameter while gathering lines range from 5 to 15 centimeters in diameter. Even at these large diameters, it takes a substantial amount of force to propel oil through a pipeline.

4. Transportation by rail is the most commonly used alternative to pipeline transportation. Since the domestic oil boom in the mid-2000s, the use of rail to transport crude oil and natural gas has increased dramatically.



5. Although pipeline and rail are generally used to transport oil and gas long distances, truck transportation is commonly used to move smaller quantities of oil and gas over shorter distances. Despite the fact that trucks have limited holding capacity, they help move oil and gas from production sites to pipelines and other long-distances transportation infrastructure, and across areas where pipeline or rail infrastructure does not exist. An average truck holds about 200 barrels of oil, about one-third of the capacity of the average railcar.



6. All three forms of transportation play a role in moving oil and gas efficiently, but each has its unique trade-offs in terms of economics, environmental impacts, and safety.



Vocabulary. Match the words 1-8 with their definitions a-j.

- | | |
|----------------------------------|---|
| 1. transporting | a. a pipeline used to transport oil |
| 2. oil pipeline | b. a pipeline which is used to transport crude oil and natural gas across countries or within states. |
| 3. fuel | c. a period of large inflow of income as a result of high global oil prices or large oil production in an economy |
| 4. truckline | d. a large, heavy road vehicle used for carrying goods, materials, or troops; a lorry. |
| 5. oil boom | e. a self-propelled railway vehicle designed to transport passengers |
| 6. truck | f. composed of the fixed installations of canals, waterways, airways, railways, roads, and terminals, as well as pipelines such as seaports, refueling depots, trucking terminals, warehouses, bus stations, railway station, and airport |
| 7. transportation infrastructure | j. material such as coal, gas, or oil that is burned to produce heat or power |
| 8. Railcar | h. take or carry (people or goods) from one place to another by means of a vehicle, aircraft, or ship |

Activity 1. Learn the vocabulary above and use them in your speech.

Reading comprehension

Exercise 1. Give the definitions of the underlined words and word combinations.

1. There are four main methods of transporting oil and gas. 2. About 70 percent of all domestically produced petroleum products is transported by pipeline. 3. Oil pipelines are generally divided into two basic sections called trunks and gathering lines. 4. Transportation by rail is the most commonly used alternative to pipeline transportation. 5. The use of rail to transport crude oil and natural gas has increased dramatically. 6. Trucks have limited holding capacity. 7. They help move oil and gas from production sites to pipelines and other long-distances. 8. Each has its unique trade-offs in terms of economics, environmental impacts, and safety.

Exercise 2. Match the headings (a-f) with the paragraphs (1-6)

- a. Parts of oil pipelines.
- b. Alternative method to pipeline transportation.
- c. The main methods oil and gas transportation.
- d. The usage of pipeline.
- e. Overall opinion about transportation methods.
- f. Comparison of oil and gas transportation methods.

Exercise 3. Answer the following questions.

1. What main methods of oil and gas transportation are there? 2. Where are pipelines commonly used? 3. What sections are oil pipelines divided into? 4. What caused the increase of crude oil and natural gas transportation by rail? 5. What is the difference between pipeline and rail transportation and truck transportation?



Speaking. Work in 3 small groups, ask each other questions about the pictures below and answer them.





Writing. Exercise 1. Answer the following question in written form.

What similarities, differences, advantages and disadvantages have abovementioned three methods of transportation?

Exercise 2. Match the words to make phrases and make up situations with them.

- | | |
|------------------|-------------------|
| 1. domestically | a. lines |
| 2. gathering | b. produced |
| 3. pipeline | c. impacts |
| 4. crude | d. capacity |
| 5. holding | e. oil |
| 6. environmental | f. transportation |



Listen. Exercise 1. Fill in the gaps.



transportation.mp3

Transportation _____ a lot in the past 100 years. When you think about _____ of our life, transportation is _____ as it was years ago. OK, cars, trains and airplanes are faster, but they're not so different than they were 50 years ago. Take airplanes, for example. I think air _____. Fifty years ago, people flew and

were given great service. Today, you are _____. And look at cars. The cars from fifty years ago look nicer than today's ones. They still had four wheels, _____ a steering wheel. I think transportation will really only _____ more personal. I'm waiting for _____ mini-copter.

Exercise 2. Unjumble the words

a in hasn't changed lot Transportation really the past 100 years. in When think changes other you about areas of our life, transportation it as same the much pretty is was years ago. OK, cars, trains and airplanes are faster, but they they're so than were not different 50 years ago. Take airplanes, for example. I think air travel has got worse. flew people, ago years Fifty were and given great service. Today, you are like sardines in a can. And look at cars. from cars The nicer look ago years fifty than today's ones. They wheels four had still and petrol used, had a steering wheel. I think transportation will really only personal change when it becomes more. I'm waiting for my own jet pack of mini-copter.

Lesson 4. Oil Tankers



Read the text. Oil Tankers

An oil tanker, also known as a petroleum tanker, is a ship designed for the bulk transportation of oil or its products. There are two basic types of oil tankers: crude tankers and product tankers. Crude tankers move large quantities of unrefined crude oil from its point of extraction to refineries. For example, moving crude oil from oil wells in Nigeria to the refineries on the coast of the United States. Product tankers, generally much smaller, are designed to move refined products from refineries to points near consuming markets. For example, moving gasoline from refineries in Europe to consumer markets in Nigeria and other West African nations.



Oil tankers generally have from 8 to 12 tanks. Each tank is split into two or three independent compartments by fore-and-aft bulkheads. The tanks are numbered with tank one being the forward most. Individual compartments are referred to by the tank number and the athwart ships position, such as "one port", "three starboard", or "six center."

A cofferdam is a small space left open between two bulkheads, to give protection from heat, fire, or collision. Tankers generally have cofferdams forward and aft of the cargo tanks, and sometimes between individual tanks. A pump room houses all the pumps connected to a tanker's cargo lines. Some larger tankers have two pump rooms. A pump room generally spans the total breadth of the ship.

Operations aboard oil tankers are governed by an established body of best practices and a large body of international law. Cargo can be moved on or off of an oil tanker in several ways. One method is for the ship to moor alongside a pier, connect with cargo hoses or marine loading arms. Another method involves mooring to offshore buoys, such as a single point mooring, and making a cargo connection via underwater cargo hoses. A third method is by ship-to-ship transfer, also known

as lightering. In this method, two ships come alongside in open sea and oil is transferred manifold to manifold via flexible hoses. Lightering is sometimes used where a loaded tanker is too large to enter a specific port.



Vocabulary. Match the words 1-11 with their definitions a-k.

- | | |
|-----------------------|---|
| 1. Oil tanker | a. the transport of large quantities of goods or commodities in lorries, ships, or by rail |
| 2. bulk transport | b. lying, running, or acting in the general line of the length of a construction (such as a ship or a house) |
| 3. Extraction oil | c. the act of colliding; a coming violently into contact |
| 4. fore-and-aft | d. a room at a spa for drinking mineral waters |
| 5. bulkhead | e. goods carried on a ship, aircraft, or motor vehicle |
| 6. collision | f. an alternative to direct hose hookups that is particularly useful for larger vessels and transfers at higher loading rates and pressures |
| 7. pump room | g. the act of mooring or tying a boat up to a submerged anchoring point not close to a dock or shoreline |
| 8. cargo | h. a pipe or chamber branching into several openings |
| 9. marine loading arm | i. a dividing wall or barrier between separate compartments inside a ship, aircraft, or other vehicle. |
| 10. offshore mooring | j. the process by which usable petroleum is drawn out from beneath the earth's surface location |
| 11. manifold | k. a ship designed for the bulk transport of oil or its products |

Activity 1. Learn the vocabulary above and use them in your speech.

Reading comprehension

Exercise 1. Give the definitions of the underlined words and word combinations.

1. An oil tanker is a ship designed for the bulk transportation of oil or its products. 2. There are two basic types of oil tankers: crude tankers and product tankers. 3. Product tankers are designed to move refined products from refineries to points near consuming markets. 4. A cofferdam is a small space left open between two bulkheads. 5. A pump room generally spans the total breadth of the ship. 6. One method is for the ship to moor alongside a pier. 7. Another method involves mooring to offshore buoys. 8. Lightering is sometimes used where a loaded tanker is too large to enter a specific port.

Exercise 2. Match the headings (a-d) with the paragraphs (1-4)

- a. Types of oil tankers and their functions.
- b. Construction of oil tankers.
- c. A space for doing underwater work.
- d. Methods of carrying out operations aboard oil tankers.

Exercise 3. Answer the following questions.

1. What is an oil tanker? 2. What types of petroleum tankers are there and what are their functions? 3. How many tanks do oil tankers generally have? 4. What is cofferdam and what is its function? 5. How are operations aboard oil tankers governed? 6. What methods of moving cargo on or off an oil tanker are there? 7. Where is lightering sometimes used?



Speaking. Work in groups. Discuss and find the solution of the problem given below. Present your answer to the other group and discuss the soundness or unsoundness of your answer.

Imagine, you work in an oil transportation company, your tanker is carrying oil and there is a leakage under the tanker. How would you solve this problem? What part of the tanker is useful in such situation?



Writing. 1. Answer the following question in written form.

What methods of moving oil on or off an oil tanker are there and what are their advantages and disadvantages?

Useful vocabulary: negative side, positive side, pros and cons, in spite of, despite, firstly, secondly, on the one hand, on the other hand, in addition, on top of this, moreover, furthermore, finally, overall, in conclusion.

2. Match the words to make phrases and make up situations with them.

- | | |
|------------------|-------------------|
| 1. oil | a. compartments |
| 2. bulk | b. markets |
| 3. consumer | c. transportation |
| 4. individual | d. tanker |
| 5. pump | e. hoses |
| 6. international | f. buoys |
| 7. offshore | g. law |
| 8. cargo | h. room |



Listen.



Oil-101Intro-to-Mid
stream.mp3

Hi, and welcome to Oil 101, the podcast. My name is Doug Stetzer and I'm content and community manager for EKT Interactive. Today we will be discussing the Midstream segment of the oil and gas industry. This content was developed by industry experts with decades of experience and used at Fortune 10 companies, oil and

gas super-majors, financial services firms, and many more. Our Fundamentals of Midstream ebook is available in the free members content library at www.ektinteractive.com.

So, What is Midstream?

As its name implies, the midstream segment of the oil and gas industry encompasses facilities and processes that sit between the upstream and downstream segments. Activities can include processing, storage and transportation of crude oil and natural gas. In most cases, oil and gas reserves are not located in the same geographic location as refining assets and major consumption regions. Transportation is a big part of midstream activities and can include using pipelines, trucking fleets, tanker ships, and rail cars.

Characteristics of the Midstream Segment

The midstream segment is separated from upstream and downstream in most integrated oil companies because it is considered a low risk, regulated type of business. It does not fit the risk profile or asset complexity of the other segments of the oil and gas industry. Success in midstream depends on many external forces including Upstream operation's continuous delivery of reserves and refinery margins that encourage refined product production. Natural gas price levels that impact the attractiveness of NGL's as feedstock also impact midstream. Healthy downstream, natural gas, and petrochemical markets are important to the midstream segment. After all, those segments contain a midstream operator's customers. Finally, political sentiment for pipeline expansion and "not in my backyard" hurdles can be challenges to midstream expansion. While the midstream gathering and processing sector is relatively free of commercial regulation, the movement of oil and gas by interstate pipelines and subsequent state level distribution activities are highly regulated in the US by the Federal Energy Regulatory Commission (FERC). Further, cross-border pipeline expansions can require approval from the Executive branch and become part of the national political debate. We've seen this scenario play out publicly with the segment of the proposed Keystone XL pipeline linking Canadian oil fields with US pipelines and refining capacity

Midstream Participants

Some of the largest North American midstream oil companies include Enterprise Products, Kinder Morgan, Enbridge, TransCanada, Williams Companies, Plains All-American, and Koch Industries. These participants are categorized by the portfolio of midstream assets they own, such as distribution, storage, processing, fractionation, and marketing. These assets will be discussed further in subsequent episodes and are covered in some of our upcoming more in depth content. We'll be sure to add links to the transcript as they become available.

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Oil and Gas Processing – Next Step in Adding Value

So, while producing crude oil and natural gas is the goal of upstream, processing oil and gas liquids into marketable products is the beginning of the midstream segment of the business. These products then continue into the refining or processing portion of the downstream segment.

Field processing is the first phase of oil and gas processing starting in the onshore or offshore production field.

Here, surface facilities are designed and installed that:

- Measure the production rate of the oil, gas, and water that is produced from the reservoir
- Separate the oil, gas, and water from one another
- Remove impurities to prepare the crude or gas for sale or the next process

- Temporarily store the crude or gas until it is ready to be moved to the next process

Fractionation plants, which remove natural gas liquids (NGL) from the produced oil and gas are also a component of the midstream activities. These NGLs are used as blend components in a refinery and used as fuel or feedstock in the manufacture of petrochemicals.

We have more materials as well as some articles on recent developments in the NGL markets that we'll link to in the program notes.

Transportation

After field processing, treated oil and gas is delivered via complex transportation, transmission and distribution infrastructure.

Crude oil and refined liquids start their journey in a spider web of small-diameter field gathering pipelines. Once accumulated, larger volumes are moved along the coast or through rivers in smaller barges and transported internationally in tankers or vessels.

Land transportation methods include pipelines, truck and rail.

Natural gas, which flows at much higher pressure than crude oil, is most often transported in large-diameter, high-pressure-handling pipelines called transmission lines. A common point of confusion in our industry, whether you're new to it or not, is NGLs vs LNG.

Natural Gas Liquids vs Liquefied Natural Gas.

NGL, LNG What's the Difference?

NGL is an acronym for Natural Gas Liquids –which are the liquid hydrocarbons normally associated with Natural gas. Most common NGLs are methane, ethane, and “heavies” like propane and butanes. Depending on the gas pressure, the heavies will condense and constitute the liquid or “wet” portion of the natural gas.

You will commonly hear differentiation in natural gas fields as to whether they are predominantly wet or dry. NGLs are much more valuable as raw material for further processing than as fuel for simple combustion.

LNG on the other hand is an acronym for Liquefied Natural Gas – the gaseous portion of natural gas (mostly the methane and a little ethane) in the liquefied state which

occurs at -260 oF. LNG is an efficient way to move, transport and handle large quantities of natural gas instead of trying to store it in the gaseous state at elevated pressures. While pipelines are the safest and most efficient and way to transport oil and gas, trucks and rail are more flexible in terms of timing and destination. Adding new pipeline infrastructure takes considerable time and investment, and often faces political resistance. The recent growth in domestic US production has led to an expansion of crude-by-rail shipments since many new fields are not connected to existing pipeline infrastructure. A lack of pipelines exists to directly service domestic refining centers in the Northeast and Gulf Coast as these have traditionally been supplied by oil imported from overseas. This concept will be discussed more in depth in the Industry Trends module.

Storage

Moving on from transportation, let's discuss storage. The methods of storage for crude oil and natural gas are quite different, so we'll break down each group separately.

Crude Oil

Storage facilities for crude oil and refined liquids is pretty straight forward. Methods include bulk terminals, refinery tanks and holding tanks to get material into pipelines, or ready to be shipped on a vessel. Cushing, OK is the delivery point for the NYMEX/CME crude oil futures contract. As such, it is an important storage location for traders looking to deliver oil against these contracts. There is currently storage capacity to hold about 65 million barrels of oil at this location (up from about 26 million in 2005). The Strategic Petroleum Reserve (SPR) is an emergency storage of oil maintained by the US Department of Energy. Current storage capacity is approximately 727 million barrels, with about 695 million barrels (or 36 days consumption) in inventory. Can anyone guess what brought about the development of the SPR? If you guessed the oil embargo of 1973-74 you're right. This supply disruption really exposed just how reliant the US was on imported oil at that time.

Natural Gas

Natural gas is another story. Because of its extremely high pressure, natural gas must be stored in underground reservoirs until it is ready to be transported to market. Most commonly depleted gas reservoirs are used, with gas being injected back into the ground to await its next move. Salt caverns and aquifers are other storage possibilities. There is approximately 3.5 trillion cubic feet of working gas in nearly 400 facilities in the US.

Midstream Oil and Gas Summary

The midstream segment of the oil and gas business concentrates on the processing, transportation, and storage of crude oil and natural gas.

Midstream activities are considered a low-risk, highly-regulated segment of the oil and gas industry.

Field processing is the first phase of oil and gas processing starting in the onshore or offshore oil or gas production field. Fractionation plants, which remove natural gas liquids (NGL) from the produced oil and gas are also a component of the midstream activities.

After field processing, treated oil and gas is delivered via a complex transportation, transmission and distribution infrastructure.

Storage facilities for crude oil and refined liquids include bulk terminals, refinery tanks and holding tanks. Because of its extremely high pressure, natural gas must be stored in underground reservoirs until it is ready to be transported to market.

Thanks for listening, and we hope you've learned a few things about the midstream segment of the oil and gas industry.

Be sure to share this as you see fit, and review us on iTunes if you have a chance. Your feedback really helps us improve as we move forward.

If you want more information about our Oil 101 content go to www.ektinteractive.com and register to access our free content library.

TESTS FOR PROGRESS CHECK ON UNIT III

1. Choose the correct answer. The drilling process ... by lowering and lifting the boring column into the well.

- A) is accompanied
- B) accompanied
- C) accompanies
- D) is accompanying

2. Choose the correct answer. What does the lifting equipment consist of?

- A) It consists of an instrument, which has to operate at this, reaches many tens of tons.
- B) It consists of the rig, drilling hoist and waist polyspast system.
- C) It consists of waist rope, hook and others.
- D) It consists of the unmovable part – crown block and the movable part – waist block

3. Choose the correct answer. By construction rigs are divided into two types: ...

- A) tower and mast
- B) lifting and lowering
- C) keeping and hanging
- D) boring and supporting

4. Choose the correct synonym to the underlined word. The lifting equipment is integral part of any drilling plant.

- A) supporting
- B) boring
- C) lifting
- D) lowering

5. Choose the correct definition of the given word. rope

- A) a linked series of pipes with pumps and valves for flow control
- B) a structural piece designed to resist pressure in the direction of its length
- C) a device or piece of equipment designed for a particular purpose
- D) a length of thick strong cord made by twisting together strands of hemp, sisal, nylon, or similar material

6. Choose the correct answer. ... characteristics of destructing rocks all drilling bits are classified ... the following ways.

- A) With/in
- B) By/in
- C) For/on
- D) By/at

7. Choose the correct answer. What are bits of crushing and splitting off action and boring heads intended for?

- A) They are intended for destructing rocks.
- B) They are intended for drilling wells.
- C) They are intended for boring un-abrasive and abrasive rocks of middle hardness, and hard, solid and very solid rocks.
- D) They are intended for

8. Choose the correct answer. Bits with diamond grain and hard alloyed pins in the pavement part are applied for boring

- A) un-abrasive rocks of middle hardness and hard rocks
- B) abrasive rocks of middle hardness, and hard, solid and very solid rocks
- C) quick rocks
- D) intermittent abrasive and un-abrasive rocks by hardness

9. Choose the correct answer. Blade bits, reinforced with diamond grains or hard alloyed pins are applied for boring

- A) abrasive rocks of middle hardness, and hard, solid and very solid rocks
- B) intermittent abrasive and un-abrasive rocks by hardness
- C) un-abrasive rocks of middle hardness and hard rocks
- D) quick rocks

10. Choose the correct definition of the given word. abrasive

- A) occurring at irregular intervals
- B) being capable of polishing or cleaning a hard surface by rubbing or grinding
- C) a precious stone consisting of a clear and colourless crystalline form of pure carbon
- D) a force or factor that controls or influences a process of growth

11. Choose the correct answer. How are oil and gas transported?

- A) They are transported by boat and road transportation by truck.

B) They are transported by pipeline and rail.

C) All are correct.

D) They are transported by boat and pipeline.

12. Choose the correct answer. What is the most commonly used method?

A) Pipeline is.

B) Truck is.

C) Boat is.

D) Rail is.

13. Choose the correct answer. Oil pipelines are generally divided into two basic sections called

A) elbow and trunk

B) support and gathering lines

C) boat and road transportation

D) trunks and gathering lines

14. Choose the correct answer. An average truck ... about 200 barrels of oil.

A) holds

B) carries

C) keeps

D) contains

15. Choose the correct definition of the given word. truck

A) a self-propelled railway vehicle designed to transport passengers

B) a large, heavy road vehicle used for carrying goods, materials, or troops; a lorry

C) material such as coal, gas, or oil that is burned to produce heat or power

D) composed of the fixed installations of canals

16. Choose the correct answer. What basic types of oil tankers are there?

A) They are crude tankers and petroleum tankers.

B) They are crude tankers and product tankers.

C) They are consumer tankers and product tankers.

D) They are only product tankers.

17. Choose the correct answer. What is the function of a cofferdam?

- A) It protects from heat, fire, or collision.
- B) It leaves a small open space between two bulkheads.
- C) It controls pump-room houses.
- D) It moves gasoline from refineries to consumer markets.

18. Choose the correct answer. Cargo can ... on or off of an oil tanker in several ways.

- A) moving
- B) be moved
- C) to move
- D) moved

19. Choose the correct answer. Crude tankers move large quantities ... unrefined crude oil ... its point ... extraction ... refineries.

- A) of/in/for/to
- B) of/to/of/from
- C) of/from/of/to
- D) of/for/of/in

20. Choose the correct definition of the given phrase. bulk transport

- A) a ship designed for the bulk transport of oil or its products
- B) a pipe or chamber branching into several openings
- C) goods carried on a ship, aircraft, or motor vehicle
- D) a transport of large quantities of goods or commodities in lorries, ships, or by rail

Unit IV. Oil and gas refining.

Lesson 1. Oil Refineries



Read the text. Oil Refineries



A refinery is a factory. A refinery takes a raw material (crude oil) and transforms it into petrol and hundreds of other useful products. A typical large refinery costs billions of pounds to build and millions more to run and upgrade. It runs around the clock 365 days a year, employs hundreds of people and occupies as much land as several hundred football pitches.

A refinery breaks crude oil down into its various components, which then are selectively changed into new products. This process takes place inside a maze of pipes and vessels. The refinery is operated from a highly automated control room.

All refineries perform three basic steps:

- Separation (fractional distillation)
- Conversion (cracking and rearranging the molecules)
- Treatment

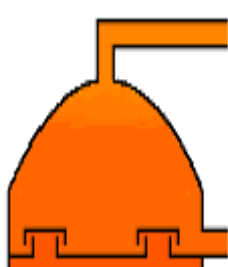
Anacortes Refinery (Tesoro), on the north end of March Point southeast of Anacortes, Washington



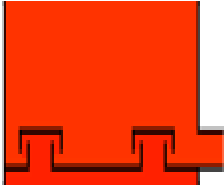

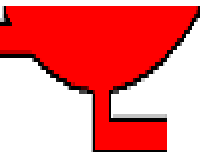
An oil refinery is an industrial process plant where crude oil is processed and refined into more useful petroleum products, such as gasoline, diesel fuel, asphalt base, heating oil, kerosene, and liquefied petroleum gas. Oil refineries are typically large sprawling industrial complexes with extensive piping running throughout, carrying streams of fluids between large chemical processing units.

Separation: fractional distillation

Modern separation involves piping crude oil through hot furnaces. The resulting liquids and vapours are passed into distillation towers:-

FRACTION	B Pt oC	Number of carbons	Uses
»Refinery gas		1-4	Bottled gas, fuels
»Petrol	40	~8	Fuel for cars



Hot crude »		»Naptha	110	~10	Raw material for chemicals and plastics
		»Kerosine	180	~15	Fuel for Aeroplanes
		»Diesel	250	~20	Fuel for cars and lorries
		»Oils	340	~35	Fuel for powers stations, lubricants and grease
		»Bitumen	400+	40+	Road surfacing.

- It is important to realize that the column is hot at the bottom and cool at the top.
- The crude oil separates into fractions according to weight and boiling point.
- The lightest fractions, including petrol and liquid petroleum gas (LPG), vaporize and rise to the top of the tower.
- Kerosene (aviation fuel) and diesel oil, stay in the middle of the tower
- Heavier liquids separate lower down.
- The heaviest fractions with the highest boiling points settle at the very bottom.



Vocabulary. Match the words 1-15 with their definitions a-o.

1.refinery

a. make a marked change in the form, nature, or

	appearance of
2.transform	b. separation of a liquid mixture into fractions differing in boiling point (and hence chemical composition) by means of distillation, typically using a fractionating column
3.a maze of pipes	c. the techniques or actions customarily applied in a specified situation
4.control room	d. a way of making changes to chemical compounds
5.fractional distillation	e. a substance that flows freely but is of constant volume, having a consistency like that of water or oil
6. cracking	f. a fossil fuel, meaning that it has been created by the decomposition of organic matter over millions of years
7.treatment	g. the act or process of separating
8.extensive	h. covering or affecting a large area
9.chemical processing	i. a substance or matter in a state in which it will expand freely to fill the whole of a container, having no fixed shape (unlike a solid) and no fixed volume (unlike a liquid
10. boiling point	j. convert or be converted into vapour
11.liquid	k. the temperature at which a liquid boils
12. petroleum	l. the process of breaking into smaller units, especially the process of splitting a large heavy hydrocarbon molecule into smaller, lighter components
13. gas	m. a pipe system that will direct water to a designated outlet with no leaks.
14. vaporize	n. where operators perform plant operations using control systems
15. separation	o. an industrial installation where a substance is refined

Activity 1. Learn the vocabulary above and use them in your speech.

Reading comprehension

Exercise 1. Give the definitions of the underlined words and word combinations.

1. A refinery takes a raw material and transforms it into petrol and hundreds of other useful products. 2. A typical large refinery costs billions of pounds to build and millions more to run and upgrade. 3. A refinery breaks crude oil down into its various components. 4. This process takes place inside a maze of pipes and vessels. 5. Modern separation involves piping crude oil through hot furnaces. 6. It is important to realize that the column is hot at the bottom and cool at the top. 7. The crude oil separates into fractions according to weight and boiling point. 8. Kerosene and diesel oil, stay in the middle of the tower.

Exercise 2. Write true (T), false (F) or not given (NG).

1. Raw materials are processed and a lot of other useful products are obtained from them at a refinery.
2. It is not too expensive to construct a typical large refinery.
3. Different components of crude oil are selectively transformed into new products at a refinery.
4. Construction of a highly automated control room of a refinery is very complicated.
5. An oil refinery is an industrial process where crude oil is processed and refined into more useful petroleum products.
6. Gasoline, diesel fuel, asphalt base, heating oil, kerosene, and liquefied petroleum gas are obtained from petroleum.
7. Pipelines of oil refineries transport liquids between large chemical processing units.
8. Hot ovens separate crude oil.

Exercise 3. Answer the following questions.

1. What is refinery and what is its function? 2. What steps do all refineries perform? 3. What products are obtained from crude oil at refineries? 4. What is the function of pipelines? 5. How is fractional distillation carried out? 6. What is important at fractional distillation? 7. How is crude oil separated into fractions?



Speaking. Work in small groups. Look at the picture. Which parts of the oil refinery do you see? Ask questions each other and answer them.



Writing. Exercise 1. Answer the following question in written form.

What oil products are produced at a refinery and what is their importance in our everyday life?

Exercise 2. Match the words to make phrases and make up situations with them.

- | | |
|-------------|-----------------|
| 1. raw | a. components |
| 2. crude | b. room |
| 3. football | c. petroleum |
| 4. various | d. distillation |

- | | |
|---------------|---------------|
| 5. control | e. pitches |
| 6. fractional | f. material |
| 7. chemical | g. processing |
| 8. liquid | h. oil |



Listen. Listen to the information about a refinery. Answer these questions.



47 Track 47.mp3

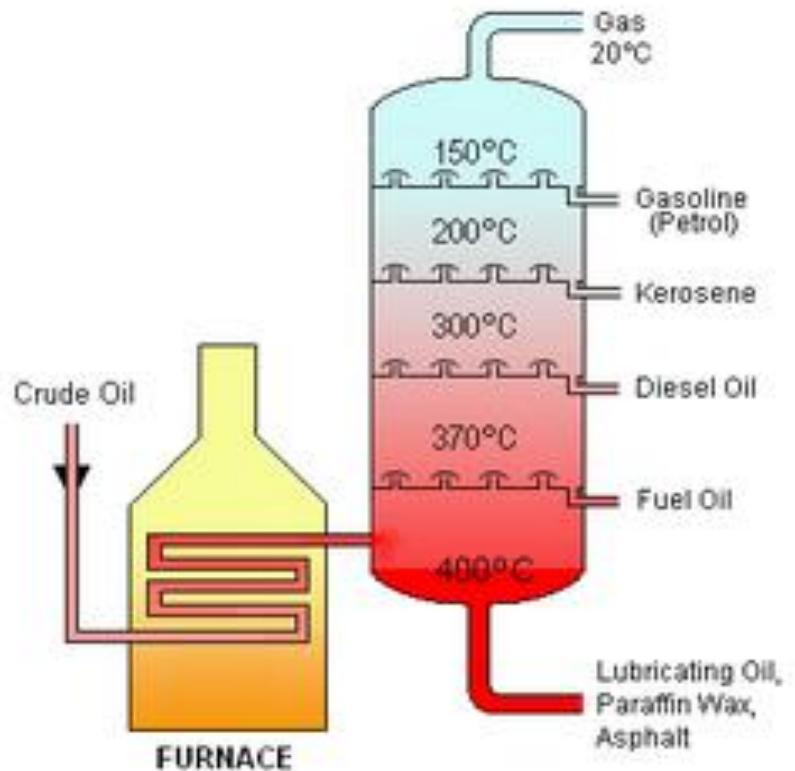
1. How big is the refinery?
2. How many gates does it have?
3. How many parking areas does it have?
4. What is the substation for?
5. What is the river for?
6. Where are the distillation columns?
7. What are the buildings in the treatment area?

Lesson 2. Preparation of oil and gas for refining



Read the text. Preparation of oil and gas for refining

1. Oil, which rises out of the mine well, carries passing gas, sand, silt, crystals of salt and water in the form of saturated solution of chlorides. Passing and dissolved in the oil gases are separated on the mine in the system of ladders of gas separators at the expense of consequent lowering of pressure from the pressure in



the well till the atmospheric pressure. Gas going out of separators over is particularly purified from infatuated condensate in intermediate receivers and directed to gas-petrol plants or pumped into wells for keeping up the layer pressure. After ladders of gas separators dissolved gases remain in the oil, amount of which sometimes reaches 4 % (mass).

2. In ladders of gas separators simultaneously with separation of gas both sedimentation of raw oil from mechanical admixtures and main mass of mine water take place, that's why these apparatus on mines are called precipitation tank (отстойник). Oil from ladders of gas separators is directed to precipitation reservoir of 30-50 thousand m³ capacities, from which it goes to mine electrical and desalting installations (EDI).

3. Oil in which content of chloride, water and mechanical admixture mustn't exceed:

Chlorides mg. l.	40
Water	0,1

Mechanical admixture

0,05

according to GOST 9965-62 is delivered to oil refineries.

4. Natural and passing oil hydrocarbon gases are valuable raw material for production of fuel and raw material for petrochemical synthesis. Main products of primary refinement of these gases – gas petrol, liquefied and dry gases, technical individual hydrocarbons: propane, isobutane, n-butane, and pentane. Refinement of natural and passing oil gas is carried out at gas refineries, which are built on enormous oil and gas mines.

5. For improvement of products` quality and conditions of exploitation of equipment of gas refineries hydrocarbon gases are preliminarily put on refinement from mechanical admixtures (suspended fractions of dust, sand, products of corrosion of gas pipelines and etc.), drainage and, at last, refinement from sulphureted hydrogen and dioxide of hydrocarbon.

6. On mines oil from wells goes to the ladders of high, middle and low pressure, where dissolved gases are isolated at the expense of lowering of pressure and directed to gas refinery. Then oil is given to reservoirs, settles in it from main mass of water, after this is directed to stabilization, that is, to extracting of light components: ethane, propane, butane, and partly pentanes. Stable oil is pumped to oil refinery, and isolated gases of stabilization serve as additional raw material of gas refineries.



Vocabulary. Match the words 1-15 with their definitions a-o.

- | | |
|-------------|---|
| 1.saturated | a. a liquid mixture in which the minor component (the solute) is uniformly distributed within the major component (the solvent) |
| 2.solution | b. the pressure exerted by the weight of the atmosphere, which at sea level has a mean value of 101,325 pascals |
| 3.dissolve | c. a liquid obtained by condensation of a gas or vapor |
| 4.mine | d. Something that is produced by mixing; a mixture: an |

admixture of vitamins and minerals

5.ladder

e. the process of removing impurities or unwanted

elements from a substance

6.atmospheric pressure

f. a colorless, odorless, flammable gas that combines

chemically with oxygen to form water: the lightest of the known elements

7.purified

g. become or cause to become incorporated into a

liquid so as to form a solution

8.condensate

h. a receptacle into which a liquid is run to give an

opportunity for any solid matter carried in it to be precipitated

9.sedimentation

i. a pit or excavation in the earth from which mineral

substances are taken

10.admixture

j. the action of making use of and benefiting from resources

11.precipitation tank

k. a part or element of a larger whole, especially a part

of a machine or vehicle

12.exploitation

l. (of an organic molecule) containing the greatest

possible number of hydrogen atoms, without carbon–carbon double or triple bonds

13.refinement

m. a piece of equipment consisting of a series of bars

or steps between two upright lengths of wood, metal, or rope, used for climbing up or down something

14.hydrogen

n. having had contaminants removed, cleansed

15.component

o. the action or process of forming or depositing sediment

Activity 1. Learn the vocabulary above and use them in your speech.

Reading comprehension

Exercise 1. Give the definitions of the underlined words and word combinations.

1. Oil, which rises out of the mine well, carries passing gas. 2. After ladders of gas separators dissolved gases remain in the oil. 3. These apparatus on mines are called

precipitation tank. 4. Oil in which content of chloride, water and mechanical admixture mustn't be in the high amount according to GOST 9965-62 is delivered to oil refineries. 5. Natural and passing oil hydrocarbon gases are valuable raw material for production of fuel and raw material for petrochemical synthesis. 6. Refining natural and passing oil gas is carried out at gas refineries, which are built on enormous oil and gas mines. 7. On mines oil from wells goes to the ladders of high, middle and low pressure. 8. Stable oil is pumped to oil refinery, and isolated gases of stabilization serve as additional raw material of gas refineries.

Exercise 2. Match the headings (a-f) with the paragraphs (1-6).

- a. Processes taking place in the precipitation tank.
- b. Refinement of natural and passing oil gases and products obtained from them.
- c. Purification of gas in gas separators.
- d. Government standards for oil content.
- e. Producing stable oil.
- f. Measures taken for the improvement of products` quality and conditions of exploitation.

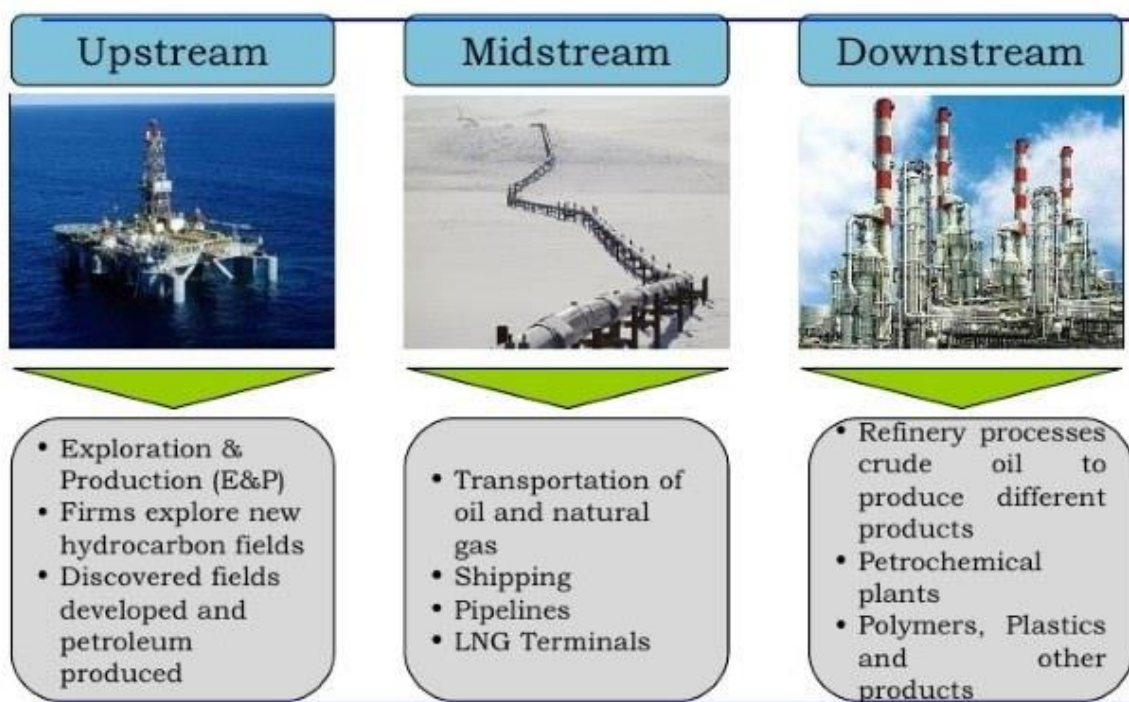
Exercise 3. Answer the following questions.

1. What does oil, rising out of the mine well, carry? 2. What happens in the system of ladders of gas separators? 3. Where is purified gas directed? 4. What happens in the precipitation tank? 5. How much must the amount of chloride, water and mechanical admixture be in oil according to GOST 9965-62? 6. What products are obtained from natural and passing oil hydrocarbon gases? 7. What is done for improvement of products` quality and conditions of exploitation of equipment of gas refineries? 8. What operation is oil from wells exposed to?



Speaking. Work in 3 groups. Each group should make a report about one of the three steps of oil and gas industry and present it. Then ask each other questions for further information.

Petroleum – Value Chain



Writing. Exercise 1. Look at the picture above and write a short information on it.

Exercise 2. Match the words to make phrases and make up sentences with them.

- | | |
|------------------|---------------|
| 1. passing | a. condensate |
| 2. saturated | b. pressure |
| 3. atmospheric | c. solution |
| 4. infatuated | d. gas |
| 5. mechanical | e. refinement |
| 6. precipitation | f. hydrogen |
| 7. primary | g. admixtures |
| 8. sulphureted | h. tank |



Listen.



55 Track 55.mp3

Listen to four conversations. Complete the incident report forms.

Incident 1

Date time: <u>10th January</u>	Time: <u>15:00</u>
Location: <i>Tank number</i> _____	
Description of incident: <i>Fire</i> _____	
Possible cause: <i>Faulty pressure</i> _____	
Action taken: <i>John Smith called the</i> _____	

Incident 2

Date time: <u>14th March</u>	Time: _____
Location: _____	
Description of incident: _____	
Possible cause: _____	
Action taken: _____	

Incident 3

Date time: <u>2nd August</u>	Time: <u>20:00</u>
Location: _____	
Description of incident: _____	
Possible cause: _____	
Action taken: _____	

Incident 4

Date time: 31st October Time: _____
Location: _____
Description of incident: _____
Possible cause: _____
Action taken: _____

Lesson 3. The main directions of oil and gas refining



Read the text. The main directions of oil and gas refining

Choice of direction of oil refining and assortment of obtained oil products is defined by physical and chemical properties of oil, level of development of oil refining techniques and demands for commodity oil products of the given economic area.



1. By the fuel variant oil is refined basically on motor and boiler fuels. At the same power of plant by oil fuel variant of refining defers with the least quantity of

technological installations and low investments. Oil refining by fuel variant may be deep and rather shallow. During deep oil refining, specialists aspire to get maximum output of high quality aircraft and motor – car petrol, wintry and summery diesel fuels and fuels for reactive motors. Output of boiler – fuel comes to minimum in this variant.

2. Thus, such composition of processes of secondary refining is foreseen and during this high qualified light motor fuel is obtained from heavy oil fractions and remains of target. Catalytic processes - catalytic cracking, catalytic reforming, hydro cracking and hydro cleaning, and thermic processes also, for example coking are belong to this. In this case refinement of factory gases are directed to increasing output of high qualified petrol. During rather shallow of oil refining, high output of boiler – fuel is foreseen.

3. By fuel and oiled variant of oil refining lubricating oils are obtained parallel with fuels. For producing lubricating oils, oils with high potential content of oiled fractions are usually selected. In this case for producing high qualified oils minimal quantity of technological installations are required. Oiled fractions (fractions, which boils up higher than 350degree), which exude from oil, first of all, are put to cleaning by electoral dissolvent: phenol or furfural, in order to pull out part of resinous substances and low indexical hydrocarbons, then deparaffination with the help of mixtures of methyl ethyl ketone or acetone with toluene (methylbenzene) for falling down the temperature of thickening of oils are conducted. Processing oiled fractions finishes with pre-cleaning by whitening kaolin.



Vocabulary. Match the words 1-19 with their definitions a-p.

- | | |
|---------------|--|
| 1.assortment | a. fuels made from crude oil and hydrocarbons contained in natural gas |
| 2.commodity | b. a heavy mineral oil used as fuel in diesel engines |
| 3.oil product | c. a process in which complex hydrocarbons are broken |

	down into simpler molecules
4. motor fuel	d. the cracking of hydrocarbons in the presence of hydrogen
5. boiler	e. a method of cleaning with high pressure streams of water to remove build up and debris in tanks and lines
6. diesel fuel	f. the solid product resulting from the destructive distillation of coal in an oven or closed chamber or by imperfect combustion, consisting principally of carbon
7. catalytical process	g. a collection of assorted things or persons
8. catalytical cracking	h. a building or group of buildings where goods are manufactured or assembled chiefly by machine
9. catalytical reforming	i. a class of oils used to reduce the friction, heat, and wear between mechanical components that are in contact with each other
10. hydrocracking	j. a component of crude oil, which has its own particular molecular composition, weight, and boiling point
11. hydro cleaning	k. an organic compound with the formula C_4H_3OCHO
12. thermal process	l. materials that contain resin, a yellow or brown sticky substance produced by plants or an artificial substance that is similar to natural resin
13. coking	m. a product of agriculture or mining
14. factory	n. a substance which can (be) dissolve(d) into a liquid
15. lubricating oils	o. a chemical process used to convert petroleum refinery naphthas distilled from crude oil (typically having low octane ratings) into high-octane liquid products called reformates, which are premium blending stocks for high-octane gasoline
16. oiled fraction	p. a process in which a chemical reaction happen more quickly by using a catalyst
17. dissolvent	q. the combination of temperature and time required to eliminate a desired number of microorganisms from

a food product

18. furfural

r. a fuel that is used to provide power to motor vehicles

19. resinous substance

s. a fuel-burning apparatus or container for heating water

Activity 1. Learn the vocabulary above and use them in your speech.

Reading comprehension

Exercise 1. Find the words for the following definitions from the text.

1. making pure by having all other substances removed from it.
2. a raw material that can be bought and sold.
3. material such as coal, gas, or oil that is burned to produce heat or power.
4. decomposing (hydrocarbons) by heat and pressure with a catalyst to produce lighter hydrocarbons, especially in oil refining.
5. of or relating to heat.
6. putting a substance such as oil on smth. so that it moves smoothly.
7. a tiny amount or proportion of something.
8. a substance that dissolves something else.

Exercise 2. Match the headings (a-c) with the paragraphs (1-3).

- a. Processes taking place in the secondary refining.
- b. Producing lubricating oils.
- c. Types of oil refining.

Exercise 3. Answer the following questions.

1. What types of oil refining are there by fuel variant? 2. What is produced during the secondary refining? 3. What do catalytic processes include? 4. How is output of high qualified petrol increased? 4. From what raw material are lubricating oils produced? 5. How are oiled fractions, which exude from oil, cleaned? 6. How does processing oiled fractions finish?



Speaking. Work with a partner. Take turns to ask and answer questions about the main directions of oil refining. Think of more questions to ask.

know / types of oil refining? - What types of oil refining do you know?

say / about the secondary refining?

explain / catalytic processes?

how / output of high qualified petrol increased?

know / raw material used for producing lubricating oils?



Writing. Exercise 1. Answer the following question in written form.

What is the difference between deep and shallow oil refining? Describe them in details.

Exercise 2. Match the words to make phrases and make up situations with them.

- | | |
|------------------|------------------|
| 1. boiler | a. refining |
| 2. technological | b. substances |
| 3. low | c. dissolvent |
| 4. oil | d. fuels |
| 5. catalytic | e. oil |
| 6. lubricating | f. process |
| 7. electoral | g. investment |
| 8. resinous | h. installations |



Listen. Fill in the gaps.



161205-oil-pipeline
_f.mp3

People in the U.S. state of North Dakota _____ angry because an oil company is _____ a giant pipe near their land. The oil company _____ to build the multibillion-dollar oil pipeline under a lake near the Standing Rock Sioux Reservation. The Sioux people _____ Native Americans who have _____ on the land for thousands of years. The Native Americans have been _____ by many protestors. They are all _____ to stop the \$3.8 billion pipeline from _____ near Sioux land. They say it will dirty their drinking water and _____ it undrinkable. They also say the pipeline will _____ sacred Sioux sites. A Texas-based company, Energy Transfer Partners, owns the 1,885-km pipeline project. It is almost complete.

The protestors are _____ themselves "water protectors". They have _____ on the site for months trying to _____ the pipeline. They were recently joined by veterans from the U.S. military. These are retired soldiers, sailors and members of the air force. The veterans have _____ the protestors shelters to _____ warm in the freezing winter. There has _____ violence between the protestors and police. A North Dakota spokesman said some of the protestors were "frightening". He said: "It's time for them to _____ home." However, Coast Guard veteran Ashleigh Jennifer Parker said: "We will _____ unarmed, completely prepared for peaceful protest. We don't even _____ the word 'protest'. We're there to _____ the water protectors."

Lesson 4. Chemical Processing

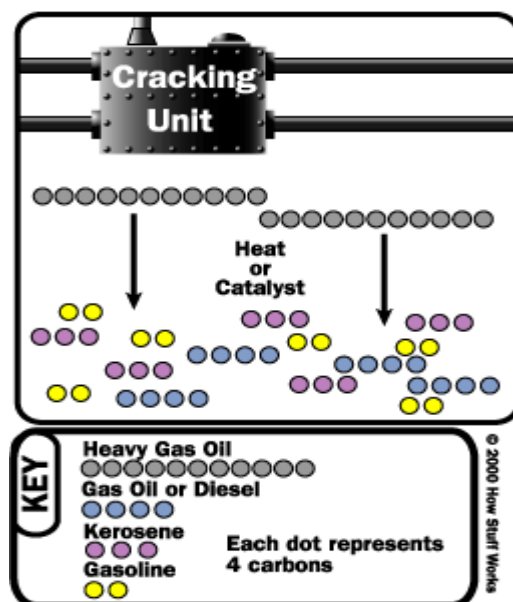


Read the text. Chemical Processing

You can change one fraction into another by one of three methods:

- breaking large hydrocarbons into smaller pieces (**cracking**)
- combining smaller pieces to make larger ones (**unification**)
- rearranging various pieces to make desired hydrocarbons (**alteration**)

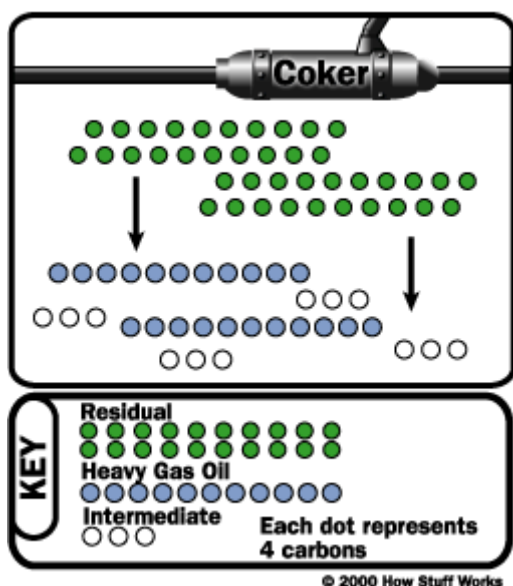
Cracking takes large hydrocarbons and breaks them into smaller ones.



Cracking breaks large chains into smaller chains. There are several types of cracking:

thermal - you heat large hydrocarbons at high temperatures (sometimes high pressures as well) until they break apart.

- **steam** - high temperature steam (1500 degrees Fahrenheit / 816 degrees Celsius) is used to break ethane, butane and naphtha into ethylene and benzene, which are used to manufacture chemicals.
- **visbreaking** - residual from the distillation tower is heated (900 degrees Fahrenheit / 482 degrees Celsius), cooled with gas oil and rapidly burned (flashed) in a distillation tower. This process reduces the viscosity of heavy weight oils and produces tar.
- **coking** - residual from the distillation tower is heated to temperatures above 900 degrees Fahrenheit / 482 degrees Celsius until it cracks into heavy oil, gasoline and naphtha. When the process is done, a heavy, almost pure carbon residue is left (**coke**); the coke is cleaned from the cokers and sold.



- **Catalytic** - uses a catalyst to speed up the cracking reaction. Catalysts include zeolite, aluminum hydrosilicate, bauxite and silica-alumina.

- **fluid catalytic cracking** - a hot, fluid catalyst (1000 degrees Fahrenheit / 538 degrees Celsius) cracks heavy gas oil into diesel oils and gasoline.

- **hydrocracking** - similar to fluid catalytic cracking, but uses a different catalyst, lower temperatures, higher pressure, and hydrogen gas. It takes heavy oil and cracks it into gasoline and kerosene (jet fuel).

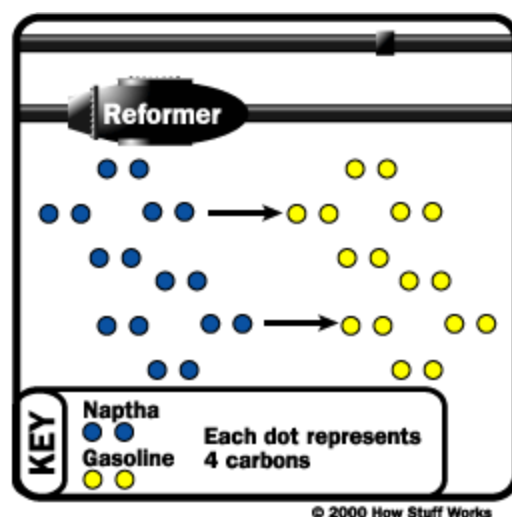
After various hydrocarbons are cracked into smaller hydrocarbons, the products go through another fractional distillation column to separate them.

Sometimes, you need to combine smaller hydrocarbons to make larger ones -- this process is called **unification**. The major unification process is called **catalytic reforming** and uses a catalyst (platinum, platinum-rhenium mix) to combine low weight naphtha into aromatics, which are used in making chemicals and in blending gasoline. A significant by-product of this reaction is hydrogen gas, which is then either used for hydrocracking or sold.

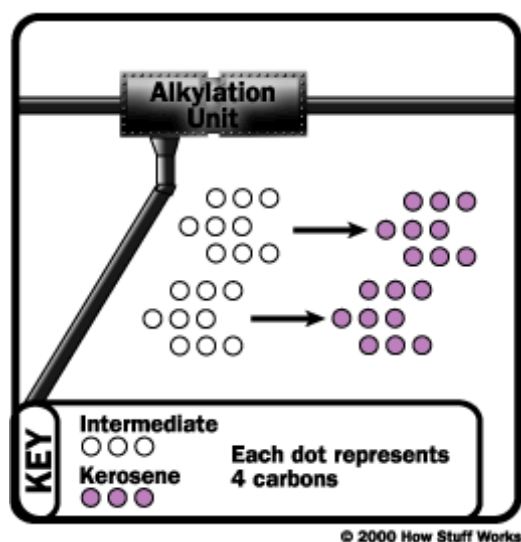
A reformer combines chains.

Alteration

Sometimes, the structures of molecules in one fraction are rearranged to produce another. Commonly, this is done using a process called **alkylation**. In alkylation, low molecular weight compounds, such as propylene and butylene, are



mixed in the presence of a catalyst such as hydrofluoric acid or sulfuric acid (a by-product from removing impurities from many oil products). The products of alkylation are **high octane hydrocarbons**, which are used in gasoline blends to reduce **knocking**.



Rearranging chains.



Vocabulary. Match the words 1-20 with their definitions a-u.

- | | |
|-----------------------|--|
| 1.unification | a. the action or process of altering or being altered |
| 2.alteration | b. a dark, thick flammable liquid distilled from wood or coal, consisting of a mixture of hydrocarbons, resins, alcohols, and other compounds |
| 3.thermal manufacture | c. an oil refinery processing unit that converts the residual oil from the vacuum distillation column into low molecular weight hydrocarbon gases, naphtha, light and heavy gas oils, and petroleum coke |
| 4.visbreaking | d. a sedimentary rock with a relatively high aluminium content |
| 5. viscosity | e. a substance that has no fixed shape and yields easily to external pressure; a gas |

	or (especially) a liquid
6.tar	f. the process of being united or made into a whole
7. residual	g. a colorless, volatile petroleum distillate, usually an intermediate product between gasoline and benzine, used as a solvent, fuel, etc
8.distillation tower	h. a colorless, fuming, corrosive liquid, HF, an aqueous solution of hydrogen fluoride, used chiefly for etching glass
9.carbon residue	i. a mild thermal cracking process applied to reduce the viscosity of VDR to produce fuel oil and some light products to increase the distillate yield in a refinery
9.coker	j. microporous, aluminosilicate minerals commonly used as commercial adsorbents and catalysts
10.zeolite	k. the process of being united or made into a whole
11.hydrosilicate	l. the act or process of introducing one or more <u>alkyl</u> groups into a compound (as to increase octane number in a motor fuel)
12.bauxite	m. a measure of a fluid's resistance to flow
13.fluid	n. a chemical substance that exists in petrol or gasoline and that is used to measure the quality of the fuel
14.unification	o. a heavy corrosive oily dibasic strong acid H_2SO_4 that is colorless when pure and is a vigorous oxidizing and dehydrating agent
15.naphtha	p. heat-driven processes like drying, smelting, heat treating, and curing to produce materials such as metals, glass, and ceramics, as well as downstream products such as electronics, vehicles, and machinery

16.alkylation	q. A silicate which contains water, particularly one which gives off water readily upon heating
17.hydrofluoric acid	r. a tall vessel in which crude oil is heated and separated into its components
18.sulfuric acid	s. a small amount of something that remains after the main part has gone or been taken or used
19.octane	t. a fossil fuel can be defined as the tendency of that fuel to form carbon deposits at high temperature in an inert atmosphere
20. steam	u. the vapour into which water is converted when heated, forming a white mist of minute water droplets in the air.

Activity 1. Learn the vocabulary above and use them in your speech.

Reading comprehension

Exercise 1. Find the words for the following definitions from the text.

1. decompose (hydrocarbons) by heat and pressure with or without a catalyst to produce lighter hydrocarbons, especially in oil refining
2. the process of being united or made into a whole
3. a change in or to something.
4. relating to or caused by heat or by changes in temperature
5. the invisible gaseous form of water, formed by boiling
6. a tall narrow building where the action of purifying a liquid by a process of heating and cooling takes place
7. the state of being thick, sticky, and semi-fluid in consistency
8. the addition of an alkane hydrocarbon to an alkene in producing high-octane fuels

Exercise 2. Write true (T), false (F) or not given (NG).

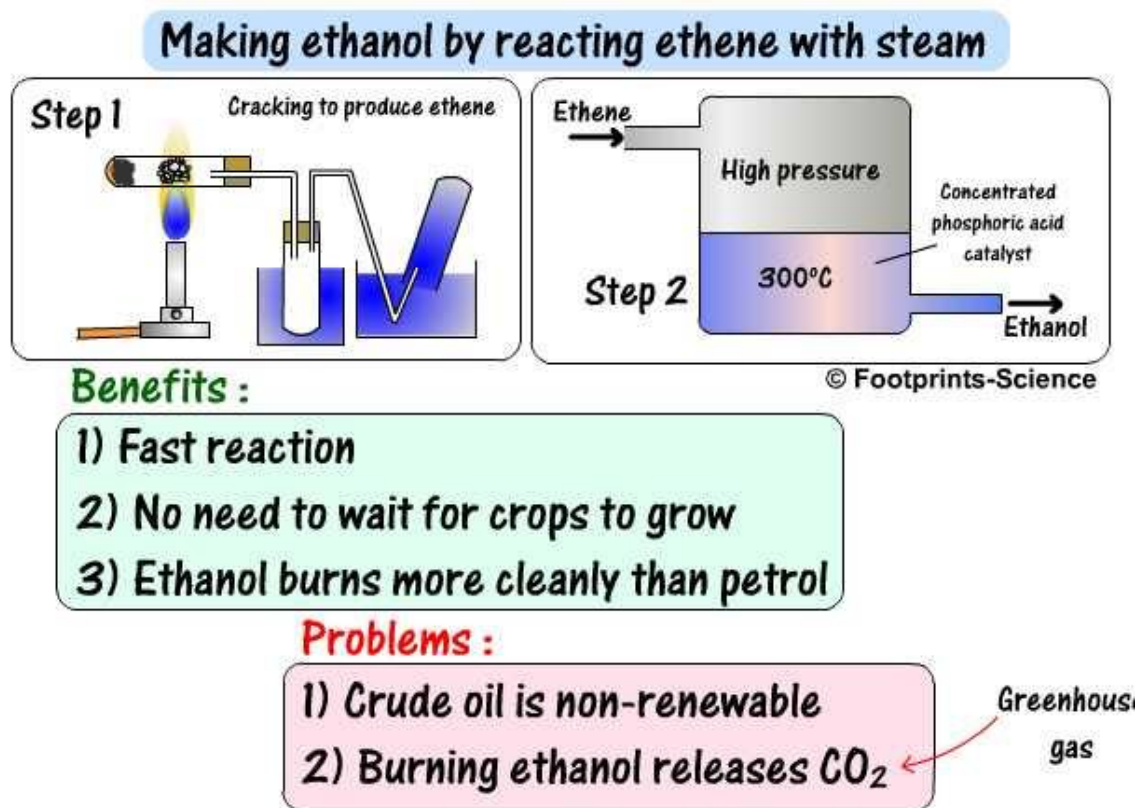
1. During cracking process large hydrocarbons are formed. 2. If there were no alteration process there would not be any desired hydrocarbons. 3. At thermal cracking pieces of hydrocarbons are formed at high temperatures. 4. Pure carbon residue left after the coking process is called coke. 5. The cracking reaction accelerates with the help of a catalyst. 6. After the cracking process smaller hydrocarbons remain in the distillation tower. 7. Using aromatics is one of the main processes in making chemicals and in blending gasoline. 8. As a result of alkylation we obtain high octane hydrocarbons.

Exercise 3. Answer the following questions.

1. What methods of changing one fraction into another are there? 2. What is the function of cracking? 3. What types of cracking are there? 4. What belongs to catalysts? 5. What is alkylation?



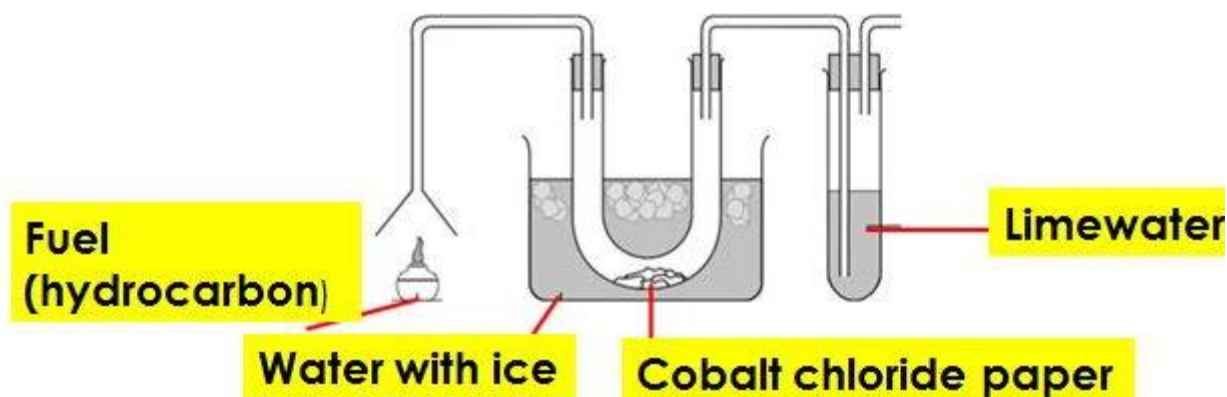
Speaking. Work in small groups. Look at the picture, ask questions the other groups and discuss each other's answers.





Writing. 1. Write a short information on the picture below using the given instructions.

Products of complete combustion



1. Explain the purpose of the cobalt chloride paper

To test for water, turns from blue to pink in the presence of water

2. Explain the purpose of the limewater

To test for carbon dioxide, turns from clear to cloudy

3. Explain the purpose of the water with ice

To condense the water vapour (gas) into liquid water

4. Write a word equation for the complete combustion of a

fuel ***Fuel + oxygen → Carbon dioxide + water***

2. Match the words to make phrases and make up situations with them.

- | | |
|-----------------|-----------------|
| 1. large | a. oil |
| 2. break | b. distillation |
| 3. manufacture | c. cracking |
| 4. distillation | d. reaction |
| 5. heavy | e. chains |
| 6. cracking | f. tower |
| 7. catalytic | g. chemicals |
| 8. fractional | h. apart |



Listen. Listen to the descriptions of five different oil deposits. As you listen, tick the petroleum products you hear.



53 Track 53.mp3

- | | |
|-----------------|---|
| 1. asphalt | 7. petrochemicals (feedstock) |
| 2. diesel fuels | 8. paraffin wax |
| 3. jet fuel | 9. automotive and industrial lubricants |
| 4. kerosene | 10. liquefied petroleum gas |
| 5. gasoline | 11. propane |
| 6. fuel oils | 12. butane |

TESTS FOR PROGRESS CHECK ON UNIT IV

1. Choose the correct answer. What is the main function of a refinery?

- A) A refinery takes a raw material (crude oil) and transforms it into petrol and hundreds of other useful products.
- B) A refinery costs billions of pounds to build and millions more to run and upgrade.
- C) It employs hundreds of people and occupies as much land as several hundred football pitches.
- D) A refinery breaks crude oil down into its various components.

2. Choose the correct answer. ... components of crude oil are selectively ... into new products.

- A) Breaking/changing
- B) Broken/changed
- C) Break/change

D) Broken/being changed

3. Choose the correct answer. What steps do all refineries perform?

A) They perform such basic steps as separation, conversion, and treatment.

B) They perform such basic steps as processing and refining.

C) They perform such basic steps as cooling and separation.

D) They perform such basic steps as processing, conversion and refining

4. Choose the correct antonym to the underlined word. Crude oil is processed and refined into more useful petroleum products.

A) helpful

B) beautiful

C) careful

D) harmful

5. Choose the correct definition of the given word. cracking

A) an industrial installation where a substance is refined

B) a way of making changes to *chemical* compounds

C) the process of breaking into smaller units

D) covering or affecting a large area

6. Choose the correct answer. Where are passing and dissolved in the oil gases separated?

A) They are separated in the mine well and saturated solution of chlorides.

B) They are separated in intermediate receivers.

C) They are separated on the mine in the system of ladders of gas separators.

D) They are separated in the exploitation equipment of gas refineries.

7. Choose the correct synonym to the underlined word. Gas going out of separators over is particularly purified from infatuated condensate.

A) clarified

B) processed

C) directed

D) exploited

8. Choose the correct answer. Refinery of natural and passing oil gas ... out at gas refineries.

- A) carry
- B) is carried
- C) is carrying
- D) has carried

9. Choose the correct answer. Oil ... ladders ... gas separators is directed ... precipitation reservoir.

- A) for/on/to
- B) from/of/to
- C) on/of/for
- D) at/of/at

10. Choose the correct definition of the given word. mine

- A) a pit or excavation in the earth from which mineral substances are taken
- B) a part or element of a larger whole
- C) the process of removing impurities or unwanted elements from a substance
- D) a liquid obtained by condensation of a gas or vapor

11. Choose the correct answer. How is choice of direction of oil refining and assortment of obtained oil products defined?

- A) It is defined by physical and chemical properties of oil.
- B) It is defined by level of development of oil refining techniques.
- C) It is defined by demands for commodity oil products of the given economic area.
- D) All are correct.

12. Choose the correct answer. During deep oil refining, specialists aspire ... maximum output of high quality aircraft and motor-car petrol.

- A) to get
- B) get
- C) getting
- D) to getting

13. Choose the correct antonym to the underlined word. In this case refining of factory gases are directed to increasing output of high qualified petrol.

- A) decreasing
- B) finding
- C) refining
- D) raising

14. Choose the correct definition of the given phrase. diesel fuel

- A) fuels made from crude *oil* and hydrocarbons contained in natural gas
- B) a product of agriculture or mining
- C) a heavy mineral oil used as fuel in diesel engines
- D) a substance which can (be) dissolve(d) into a liquid

15. Choose the correct answer. For producing lubricating oils, ... are usually selected.

- A) oiled fractions
- B) phenol and furfural
- C) oils with high potential content of oiled fractions
- D) diesel fuels and fuels for reactive motors

16. Choose the correct answer. One fraction can be changed into another by

- A) All are correct.
- B) breaking large hydrocarbons into smaller pieces (**cracking**)
- C) combining smaller pieces to make larger ones (**unification**)
- D) rearranging various pieces to make desired hydrocarbons (**alteration**)

17. Choose the correct answer. Sometimes, you need ... smaller hydrocarbons to make larger ones.

- A) to be combined
- B) combining
- C) to combine
- D) combine

18. Choose the correct answer. Commonly, this is done ... a process called alkylation.

- A) is using
- B) used
- C) use
- D) using

19. Choose the correct synonym to the underlined word. You heat large hydrocarbons at high temperatures.

- A) fall
- B) fill
- C) chill
- D) deal

20. Choose the correct definition of the given phrase. unification

- A) a sedimentary rock with a relatively high aluminum content
- B) process of altering or being altered
- C) the process of being united or made into a whole
- D) process of introducing one or more alkyl groups into a compound

Unit V. Oil and gas products

Lesson 1. Wax, Paraffin and Bitumen

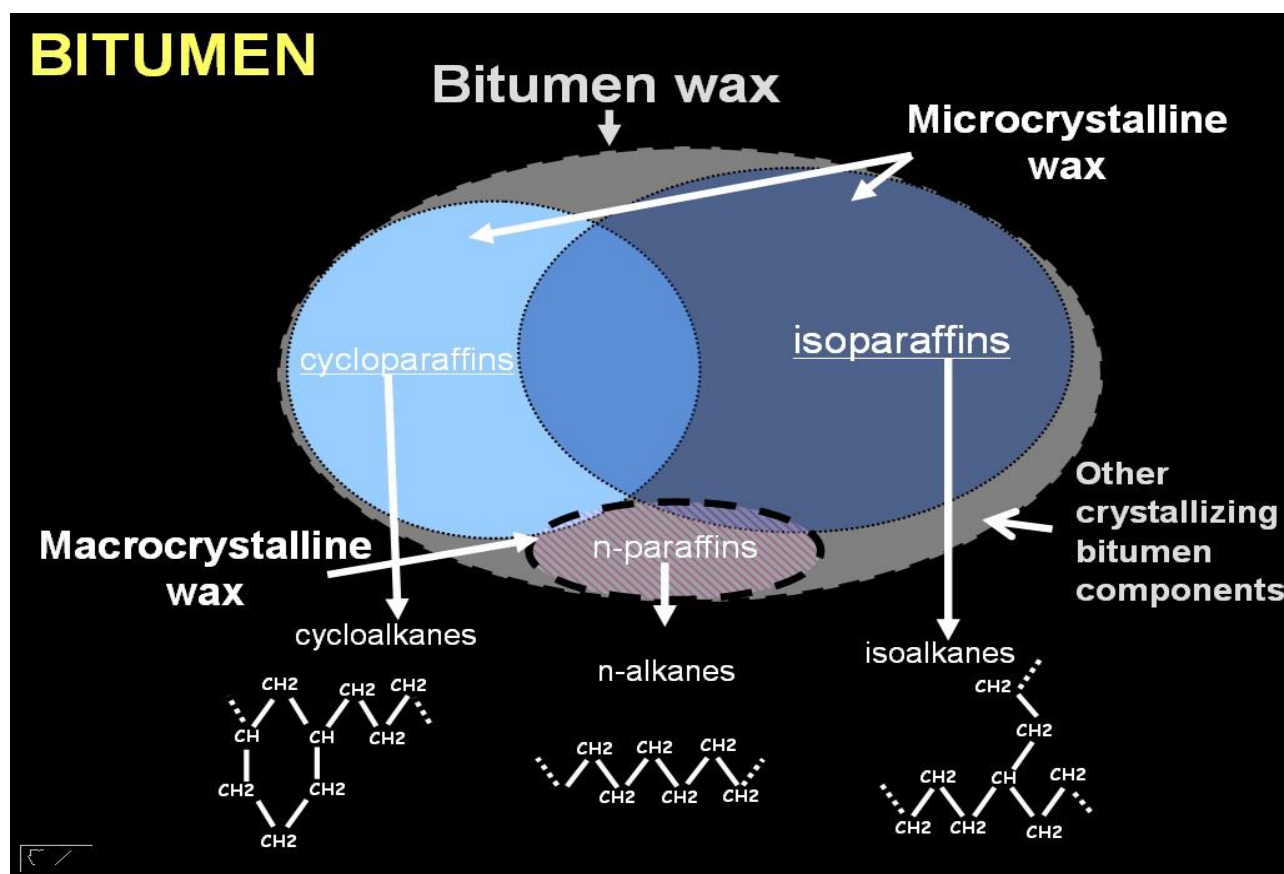


Read the text. Wax, Paraffin and Bitumen

1. Wax is used in a lot of industrial applications, such as production of candles, polishes, crayons, and impregnating substances. Much of this wax comes from petroleum, which is the largest single source of hydrocarbon waxes. Petroleum wax is a by-product in the petroleum industry. For instance, in order to produce lubricating oil with proper low temperature properties, the wax has to be removed from the oil.

2. Paraffin rich crude oil is generally considered not quite suitable for bitumen

production, but lack of asphaltenes rich crude oils may demand the use of paraffin naphthenic crude oils as base material at the production of bitumen. However, the wax content as a rule does not constitute any criteria of usefulness at bitumen production, as the wax varies with distillation grade and type of crude oil. The choice of base material for bitumen production is therefore judged by the heavy distillate residue rather than by the crude oil wax content. It has been suggested that wax content in bitumen should not be more than 3 %. If this is a relevant figure or not, depends on the definition of wax in bitumen. Isolating wax from bitumen is a process affected by several variables, which is currently not fully understood and controllable. Furthermore, distinct definitions of different wax concepts do not currently exist.



3. In the case of blown bitumen and/or wax modified bitumen in road construction, the effects on asphalt concrete properties may vary considerably. Therefore, commercial wax as an additive to bitumen became of larger interest in the project. In practice, as already mentioned, commercial wax, like FT-paraffin or montan

wax, is added to bitumen in order to achieve certain preferred properties like reduced asphalt mixing temperature and higher stiffness of the pavement.



Vocabulary. Match the words 1-15 with their definitions a-o.

- | | |
|---------------------------|---|
| 1.wax | a. a stick of pigmented wax used for writing or drawing |
| 2.candle | b. a mixture of hydrocarbons that exists in liquid phase in natural underground reservoirs and remains liquid at atmospheric pressure after passing through surface separating facilities |
| 3.crayons | c. a substance added to something in small quantities to improve or preserve it |
| 4.impregnating substances | d. a dark-brown bituminous wax extracted from lignite and peat: used chiefly in polishes and waxes for furniture, shoes, etc |
| 5.paraffin | e. a composite material commonly used in construction of roads, highways, airports, parking lots, and many other types of pavement. |
| 6.crude oil | f. inability to move easily and without pain |
| 7.distillate | g. an oil (as a petroleum distillate or a fatty oil) used as a lubricant |
| 8.additive | h. the action of making or manufacturing from components or raw materials, or the process of being so manufactured |
| 9.bitumen | i. make the surface of (something) smooth and shiny by rubbing it |
| 10. montan wax | j. to fill interstices of with a substance |
| 11. asphalt concrete | k. a sticky yellowish mouldable substance secreted by honeybees as the material of a honeycomb; beeswax |
| 12. stiffness | l. the liquid that has been condensed from vapour during distillation |
| 13. polish | m. a black viscous mixture of hydrocarbons obtained naturally or as a residue from petroleum distillation. It is used for road surfacing and roofing |

14. production n. a flammable, whitish, translucent, waxy solid consisting of a mixture of saturated hydrocarbons, obtained by distillation from petroleum

15. lubricating oil o. a cylinder or block of wax or tallow with a central wick which is lit to produce light as it burns

Activity 1. Learn the vocabulary above and use them in your speech.

Reading comprehension

Exercise 1. Find words for the following definitions in the text.

1. relating to or characterized by industry.
2. a stick of hard wax with a piece of string called a wick through the middle.
3. a pencil containing colored wax or clay, or a rod of colored wax used for drawing.
4. oil which is found under the surface of the earth or under the sea bed.
5. a black sticky substance which is obtained from tar or petrol and is used in making roads.
6. a solid, slightly shiny substance made of fat or oil which is used to make candles and polish.
7. cause (a person or place) to be or remain alone or apart from others.
8. a path with a hard surface, usually by the side of a road.

Exercise 2. Match the headings (a-c) with the paragraphs (1-3)

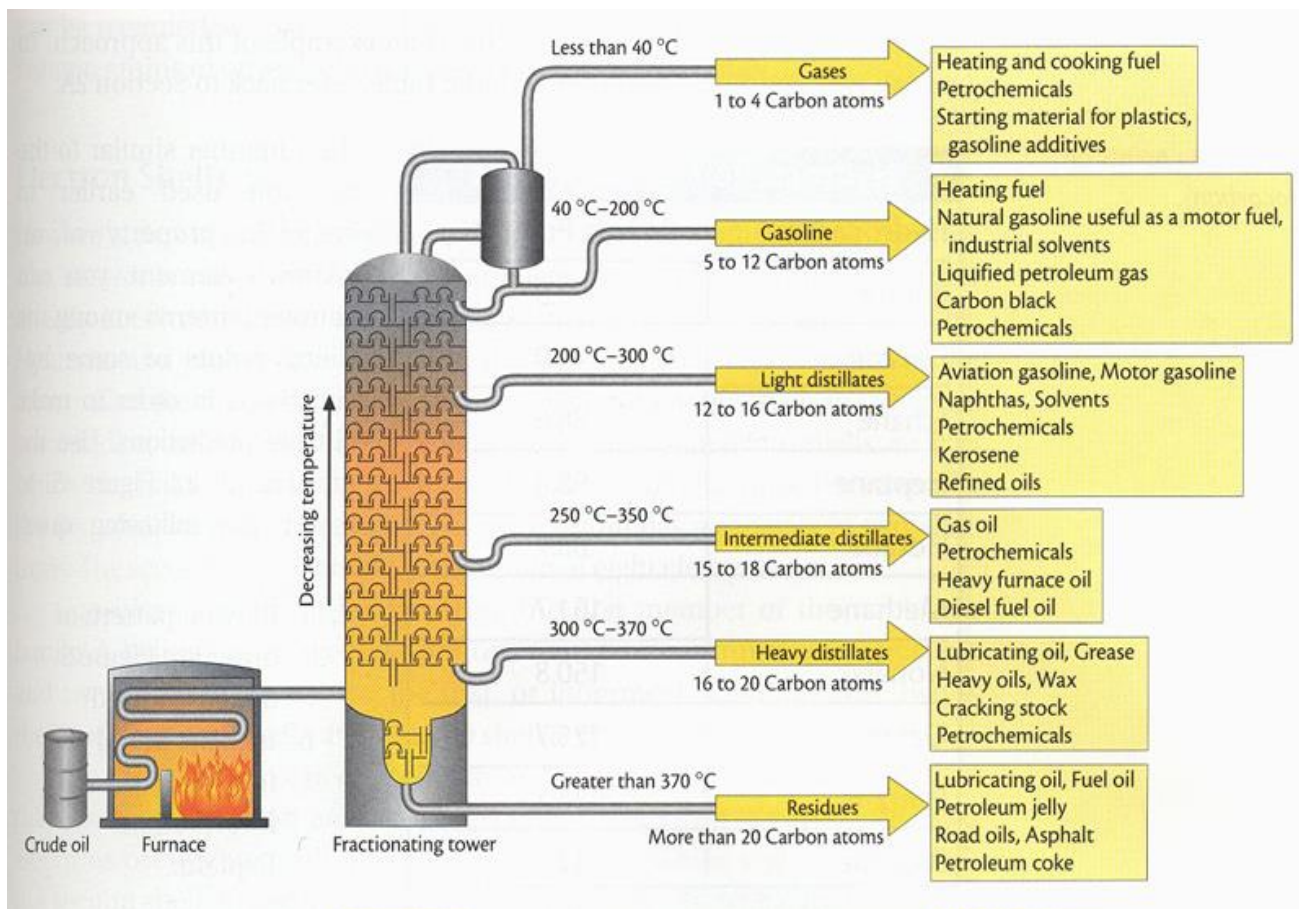
- a. Increasing properties of bitumen.
- b. Wax.
- c. Suitable materials for bitumen production.

Exercise 3. Answer the following questions

1. What industrial applications does wax have? 2. What kind of wax contains in petroleum? 3. When does the wax have to be removed from the oil? 4. What is the base material at the production of bitumen? 5. How is the choice of base material for bitumen production judged? 6. Why is commercial wax added to bitumen?



Speaking. Make a speech on the picture below.



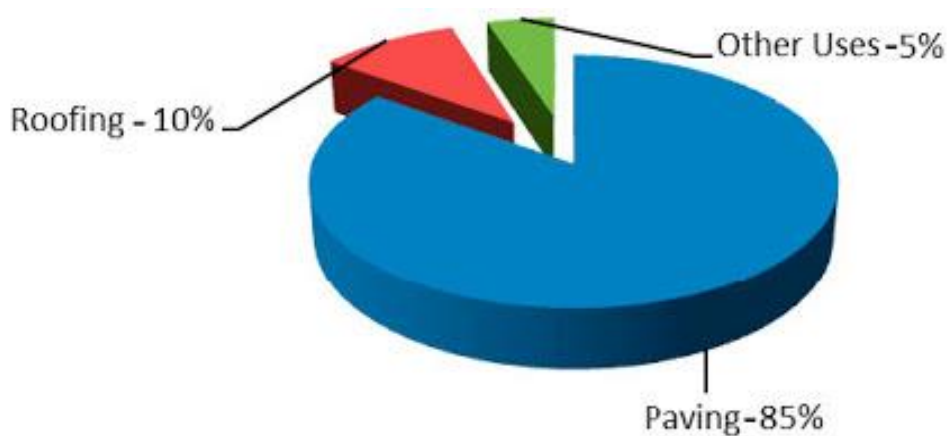
Writing. Describe the pie-chart below using the useful vocabulary.

Begin your writing as in the model:

Model: The pie-chart provides information about

The pie-chart gives an overview of

As shown in the pie-chart



Useful Vocabulary			
Expressing movement:		Describing the movement:	
verbs	nouns	adjectives	adverbs
Rose (to)	a rise	dramatic	Dramatically
increased to	an increase	sharp	Sharply
went up to	Growth	huge, enormous	Enormously
climbed to	an upward trend	steep	steeply
boomed	a boom (a dramatic rise)	substantial	Substantially
fell (to)	a decrease	considerable	considerably
declined (to)	a decline	significant	significantly
decreased (to)	a fall	marked	markedly
dipped (to)	a drop	moderate	moderately

dropped (to)	a slump (a dramatic fall)	slight	Slightly
went down (to) reduced (to)	a reduction	small, minimal	Minimally
leveled out (at)	a leveling out	Describing the speed of change	
did not change remained stable (at) remained steady (at) stayed (at) stayed constant (at) maintained the same level	no change	adjective rapid quick swift sudden steady gradual slow	adverbs rapidly quickly swiftly suddenly steadily gradually slowly
fluctuated (around)	a fluctuation		
peaked (at)	reached a peak (of)		
stood at (use this phrase to focus on a particular point, before we mention the movement, for example: In the first year, unemployment stood at...)			



Listen. Listen and fill in the gaps.



190918-saudi-dron
e-attack.mp3

Oil prices _____ on Monday after the drone attacks on oil plants in Saudi Arabia. Prices _____ their biggest rise in a decade. At one point, prices _____ up by nearly 20 per cent. This _____ the biggest one-day rise since the 1990-91 Gulf War. Saudi Arabia's Energy Minister Prince Abdulaziz bin Salman _____ the drone attack on Saudi Arabia's Abqaiq oil plant _____ the kingdom's oil production in half. The attacks will cut the world's daily oil production by five per cent. The Bloomberg news agency said it could _____ weeks for Saudi to _____ the damage. During this time, people could _____ higher gasoline prices at the pumps, especially in Asia. People may also have to _____ higher prices for food and other goods.

Yemen's Houthi group has _____ responsibility for the attacks in Saudi Arabia. The group said the attacks _____ because of Saudi Arabia's attacks on rebel groups in Yemen. Iran's President Hassan Rouhani _____ the Houthi claim. He _____ the attack an act of self-defense. He said: "Yemeni people are _____ their legitimate right of defense. The attack was a reciprocal response to years of Saudi aggression against Yemen." However, an Arab coalition says there _____ evidence that the weapons _____ to strike the Saudi oil plants were _____ by Iran. US officials say satellite images _____ the attack _____ from either Iraq or Iran and not Yemen. Iranian officials called the US allegations "maximum lies".

Lesson 2. The use of oil in food industry



Read the text. The use of oil in food industry

1. Petroleum is widely renowned as a resource that powers cars, planes and other vehicles. Other applications include lubricating machinery and creating the petro-chemicals that are used to manufacture clothes, computers, cleaning products and more. But did you know that the naturally occurring liquid is also found in a myriad of consumables?

2. In the food industry it's known as mineral oil. Unlike its counterparts such as



vegetable and olive oil, petroleum doesn't go rancid. Why? Primarily because it's not a food.

3. So where could petroleum be lurking in your pantry? Read on as we uncover some of the most common places the controversial ingredient hides:



- Packaged baked goods often contain petroleum as a way of keeping them 'fresh' and mould free. While regular flour, water, egg, milk and sugar combinations go bad relatively quickly, mineral oil keeps them at their prime for

weeks.

- Some chocolates are made with petroleum by-products. You'll see this labeled as food-grade paraffin wax.
- Any product that contains olestra is also a cause for concern. It's an indigestible plastic with similar properties to mineral oil.
- Petroleum derived products are commonly used in a kaleidoscope of food colourings. These are added to everything from corn chips to fresh apples.

- They may not necessarily be classified as ‘edibles’ but painkillers and vitamins are often packed full of petrochemicals. They contain acetylsalicylic acid, the active ingredient in a multitude of over the counter painkillers such as aspirin.
 - Food additives can also be packed full of petroleum. Canned products are a particular concern as oil is used to extend their shelf lives.
4. While food manufacturers maintain that petroleum derived ingredients are perfectly safe, some health scientists insist that they’ve hugely dangerous. They’ve found links to cancer, ADHD in children and a plethora of other health problems.



Vocabulary. Match the words 1-15 with their definitions a-o.

- | | |
|----------------------|---|
| 1.renowned | a. a commodity that is intended to be used up relatively quickly |
| 2.petrochemicals | b. a stock or supply of money, materials, staff, and other assets that can be drawn on by a person or organization in order to function effectively |
| 3.consumable | c. a countless or extremely great number of people or things |
| 4.mineral oil | d. substances (usually liquids, powders, sprays, or granules) used to remove dirt, including dust, stains, bad smells, and clutter on surfaces |
| 5.resource | e. (of foods containing fat or oil) smelling or tasting unpleasant as a result of being old and stale |
| 6. myriad | f. known or talked about by many people; famous |
| 7. cleaning products | g. fit for human consumption or permitted to come in contact with food |
| 8. food industry | h. a fat substitute that adds no calories to products |
| 9. rancid | i. food preserved by canning |
| 10. counterpart | j. substances used to impart colour to food |
| 11.food-grade | k. a synthetic material made from a wide range of |

organic polymers such as polyethylene, PVC, nylon, etc

- | | |
|--------------------|---|
| 12.olestra | l. the chemical products obtained from petroleum by refining |
| 13.plastic | m. a person or thing that corresponds to or has the same function as another person or thing in a different place or situation |
| 14.food colourings | n. a collection of all activities that facilitate the consumption and supply of food products and services across the world |
| 15.canned products | o. any of various colorless, odorless, light mixtures of higher alkanes from a mineral source, particularly a distillate of petroleum, as distinct from usually edible vegetable oils |

Activity 1. Learn the vocabulary above and use them in your speech.

Reading comprehension

Exercise 1. Find words for the following definitions in the text.

1. a machine with an engine, for example a bus, car, or truck, that carries people or things from place to place
2. a chemical obtained from petroleum and natural gas
3. make (something) on a large scale using machinery
4. a very large number or great variety of smth. or smb.
5. a person or thing that corresponds to or has the same function as another person or thing in a different place or situation
6. getting bad and tasting old and unpleasant
7. be present in a latent or barely discernible state, although still presenting a threat
8. a small room or cupboard in which food, crockery, and cutlery are kept
9. a distinctive and typical style, form, or character

10. an incidental or secondary product made in the manufacture or synthesis of something else.

Exercise 2. Match the headings (a-d) with the paragraphs (1-4)

- a. The difference between petroleum and its counterparts.
- b. Harm of petroleum containing products.
- c. Spheres of application of crude oil.
- d. Places where we do not notice petroleum.

Exercise 3. Find the extra word in each line.

Where is petroleum lurking?

- 1. _____ Packaged baked goods are often contain petroleum as a way of keeping
- 2. _____ them ‘fresh’ and mould free. While a regular flour, water, egg, milk and
- 3. _____ sugar combinations go bad relatively quickly, mineral oil may keeps them at
- 4. _____ their prime for weeks. Some chocolates are made with a petroleum by-
- 5. _____ products. You’ll be see this labeled as food-grade paraffin wax.
- 6. _____ Any product that is contains olestra is also a cause for concern. It’s an
- 7. _____ indigestible plastic with a similar properties to mineral oil.
- 8. _____ Petroleum derived products are commonly be used in a kaleidoscope of
- 9. _____ food colourings. These are added to everything from a corn chips to fresh
- 10. _____ apples. They may not necessarily be classified as being ‘edibles’.

Exercise 4. Answer the following questions.

1. Where is petroleum widely used? 2. What does mineral oil differ from its counterparts? 3. Where don’t we notice the existence of petroleum? 4. How do the opinions of food manufacturers and health scientists differ about the impact of mineral on people’s health?



Speaking. Work in pairs. Make a dialogue on the theme “Petroleum derived ingredients are perfectly safe”. Role-play your dialogue.



Writing. Read the following essay, define its parts, find academic words and linking phrases. Try to write an essay of your own on the theme “Advantages and disadvantages of using oil products in food industry”.

Most foods that are purchased these days in small stores and supermarkets have chemicals in them as these are used to improve production and ensure the food lasts for longer. However, there are concerns that these have harmful effects. In my opinion, the potential dangers from this are greater than the benefits we receive.

There are several reasons why chemicals are placed in food. Firstly, it is to improve the product to the eye, and this is achieved via the use of colourings which encourage people to purchase food that may otherwise not look tempting to eat. Another reason is to preserve the food. Much of the food we eat would not actually last that long if it were not for chemicals they contain, so again this is an advantage to the companies that sell food as their products have a longer shelf life.

From this evidence, it is clear to me that the main benefits are, therefore, to the companies and not to the customer. Although companies claim these food additives are safe and they have research to support this, the research is quite possibly biased as it comes from their own companies or people with connections to these companies. It is common to read reports these days in the press about possible links to various health issues such as cancer. Food additives have also been linked to problems such as hyperactivity in children.

To conclude, despite the fact that there are benefits to placing chemicals in food, I believe that these principally help the companies but could be a danger to the public. It is unlikely that this practice can be stopped, so food must be clearly labeled and it is

my hope that organic products will become more readily available at reasonable prices to all.



Listen. Fill in the gaps.



food.mp3

Isn't food _____ greatest pleasures? Do you know anyone who doesn't like food? I don't. There _____ delicious food in the world. You _____ whole lifetime eating a different dish every day. What's the tastiest food in the world? This _____ difficult question to answer. My taste in food keeps changing. Sometimes my favourite is a dessert, but then I _____ and go for a spicy curry. It's great that countries have so many different dishes. Do _____ national dish is best? Nowadays we have to be careful _____ eat. Fast food is not good for us. We need _____ on healthy food. Maybe we have to _____ in the future. _____ food you eat is good for you.

Lesson 3. Oil fuels



Read the text. Oil and gas fuels

Gasoline (petrol) is the most consumed petroleum product. Gasoline (petrol) is produced in several grades of octane rating. Gasoline (petrol) used in internal combustion engines can have significant effects on the local environment, and is also a contributor to global human carbon dioxide emissions. Gasoline (petrol) can also enter the environment uncombusted, both as liquid and as vapor, from leakage and handling during production, transport and delivery (e.g., from storage tanks, from spills, etc.). Gasoline (petrol) contains benzene and other known carcinogens.

Distillate fuel oil is the second most-consumed petroleum product. Distillate fuel oil includes diesel fuel and heating oil. Diesel fuel is used in the diesel engines of heavy construction equipment, trucks, buses, tractors, boats, trains, some automobiles, and electricity generators.

Heating oil, also called fuel oil, is used in boilers and furnaces for heating homes and buildings, for industrial heating, and for producing electricity in power plants.

Hydrocarbon gas liquids (HGL), the third most-used category of petroleum, include propane, ethane, butane, and other hydrocarbon gas liquids that are produced at natural gas processing plants and oil refineries. The petrochemical industry uses HGL as feedstock for making many products.

Propane, a heavily consumed HGL, is also used in homes for space heating and water heating, for clothes drying, for cooking, for heating greenhouses and livestock housing, for drying crops, and as a transportation fuel.

Jet fuel is the fourth most-used petroleum product.



Vocabulary. Match the words 1-15 with their definitions a-o.

- | | |
|-------------------------------|--|
| 1. gasoline | a. a colourless, odourless gas produced by burning carbon and organic compounds and by respiration |
| 2. internal combustion engine | b. very similar to the diesel fuel used for motors and has a low viscosity |
| 3. carbon dioxide | c. an oil that is used for fuel and that usually has a higher flash point than kerosene |
| 4. emission | d. an industry branch that produces organic intermediate products such as refinery products, natural gas, plastic, rubber, fiber raw materials |
| 5. fuel oil | e. a type of aviation fuel designed for use in aircraft powered by gas-turbine engines. |

6.diesel fuel	f. a flammable hydrocarbon gas of the alkane series, present in natural gas and used as bottled fuel
7.heating oil	g. farm animals regarded as an asset
8.petrochemical industry	h. refined petroleum used as fuel for internal combustion engines; petrol
9.jet fuel	i. the circumstances, objects, or conditions by which one is surrounded
10.environment	j. a gas obtained from petroleum, used in its liquid form as a fuel
11. propane	k. the production and discharge of something, especially gas or radiation
12.buthane	l. a glass building in which plants that need protection from cold weather are grown
13. greenhouses	m. a heavy mineral oil used as fuel in diesel engines
14. livestock	n. a cultivated plant that is grown on a large scale commercially, especially a cereal, fruit, or vegetable
15. crop	o. a group of devices in which combustion's reactants (oxidizer and fuel) and products serve as the engine's working fluids

Activity 1. Learn the vocabulary above and use them in your speech.

Reading comprehension

Exercise 1. Find words or phrases for the following definitions in the text.

1. refined petroleum used as fuel for internal combustion engines
2. a particular level of rank, quality, proficiency, intensity, or value
3. an engine that creates its energy by burning fuel inside itself
4. a colourless, odourless gas produced by burning carbon and organic compounds and by respiration
5. a substance capable of causing cancer in living tissues

6. a fuel-burning apparatus or container for heating water
7. raw material to supply or fuel a machine or industrial process
8. a glass building in which you grow plants that need to be protected from bad weather

Exercise 2. Read the text quickly and choose the sentences which best summarizes the main idea.

1. The most consumed petroleum product.
2. Oil and gas fuels and spheres of their usage.
3. Hydrocarbon gas liquids.

Exercise 3. Write true (T), false (F) or not given (NG).

1. Internal combustion engines can run with only gasoline.
2. Distillate fuel oil is less consumed than gasoline.
3. Benzene and other known carcinogens are obtained from gasoline.
4. Diesel fuel generates electricity.
5. Natural gas processing plants and oil refineries could not work without hydrocarbon gas.
6. Propane, a heavily consumed HGL, is widely used in our everyday life.

Exercise 4. Answer the following questions.

1. Where is gasoline (petrol) mostly used?
2. What does gasoline (petrol) contain?
3. Where can we find diesel fuel and heating oil?
4. What is the second name heating oil and where is it used?
5. What do hydrocarbon gas liquids include?
6. Where is propane used?



Speaking. Work in pairs. Make a dialogue on the theme “The role of fuels in our life”. Role-play your dialogue.



Writing. Exercise 1. Answer the following question in written form.

What would our life look like if there were no oil and gas fuels in it?

Exercise 2. Match the words to make phrases and make up sentences with them.

- | | |
|----------------|---------------|
| 1. petroleum | a. fuel |
| 2. significant | b. oil |
| 3. diesel | c. gas |
| 4. heating | d. effects |
| 5. diesel | e. product |
| 6. electricity | f. housing |
| 7. power | g. housing |
| 8. hydrocarbon | h. fuel |
| 9. livestock | i. plants |
| 10. jet | j. generators |



Listen. Give the definitions of the highlighted words and phrases.



Gas Station —
DailyESL.com.mp3

When I need gas for my car, I pull into a **gas station** right around the corner from my house and use my gas card. Years ago, full-service gas stations were very common. The gas station **attendant** would put gas in your car, **check the oil level** in your engine and air pressure in your tires, and wash your windows. However, things have changed. Now, most gas stations are self-service centers where you do all your **car maintenance**. Personally, I usually **fill the car up** with gas every time I stop. I generally pay with cash, but more and more gas stations **accept credit cards**, and you can pay at the **gas pump** outside without going into the station to pay the cashier directly. Now, because gas prices are **on the rise**, I am thinking about buying a more **fuel-efficient vehicle** or just taking the bus to work.

Lesson 4. The use of oil in cosmetology



Read the text. The use of oil in cosmetology

1. Mineral oil is a colorless and odorless oil that's made from petroleum—as a by-product of the distillation of petroleum to produce gasoline. It's long been used as a common ingredient in lotions, creams, ointments, and cosmetics. It's lightweight and inexpensive, and helps reduce water loss from the skin.



2. While the source of mineral oil (petroleum) often leads to criticism of its use, one must remember that the white mineral oil used in cosmetic products is extracted from the petroleum and highly purified, not unlike the extraction and purification of vegetable oils. The purification of mineral oil results in a liquid of sufficiently high quality that is safe for use in the U.S. as an over-the-counter (OTC) oral laxative and OTC skin protectant.

3. Mineral oil has long been recognized as an important part of many cosmetic formulations. Its unique feel and properties have enabled it to be used in a wide variety of cosmetics and personal care products, from bath oils, hair care products, to skin care cosmetics where it provides many benefits including moisturizing and skin softening. Reported uses for mineral oil include as a hair conditioning agent, skin conditioning agent - emollient, skin conditioning agent-occlusive, skin protectant and as a solvent .

4. Mineral oil is considered “comedogenic” which means it can clog your pores and increase the risk of acne and blackheads. The more refined, the less comedogenic, but there’s no way to know (unless the company is willing to tell you) how purified the mineral oil is that’s in your product. The highest grade available is called “pharmaceutical grade,” or “mineral oil USP.”



Vocabulary. Match the words 1-15 with their definitions a-o.

- | | |
|------------------|--|
| 1. colorless | a. the property of a substance that activates the sense of smell |
| 2. odorless | b. a clear, colourless, oily liquid that is a by-product of the distillation of petroleum |
| 3. lotion | c. having had contaminants removed; cleansed |
| 4. cream | d. any of a large group of oils that are esters of fatty acids and glycerol, obtained from the leaves, fruit, or seeds of plants |
| 5. ointment | e. a substance that provides protection, e.g. against disease or ultraviolet radiation |
| 6. mineral oil | f. a preparation applied to the body, especially the face, to improve its appearance |
| 7. purified | g. a scented oil added to your bath water |
| 8. acne | h. (especially of a gas or liquid) without colour |
| 9. vegetable oil | i. the process of becoming softer |
| 10. protectant | j. serving to occlude |

- | | |
|----------------------|--|
| 11.cosmetic | k. a thick, smooth liquid preparation designed to be applied to the skin for medicinal or cosmetic purposes |
| 12.bath oil | l. tending to cause blackheads by blocking the pores of the skin |
| 13.softening | m. a thick liquid or semi-solid cosmetic or medical preparation applied to the skin |
| 14.occlusive solvent | n. a skin condition characterized by red pimples on the skin, especially on the face, due to inflamed or infected sebaceous glands and prevalent chiefly among adolescents |
| 15.comedogenic | o. a smooth oily substance that is rubbed on the skin for medicinal purposes or as a cosmetic |

Activity 1. Learn the vocabulary above and use them in your speech.

Reading comprehension

Exercise 1. Find words or phrases for the following definitions in the text.

1. a component part or element of something
2. a thick, smooth liquid preparation designed to be applied to the skin for medicinal or cosmetic purposes
3. a smooth thick substance that is put on sore skin or a wound to help it heal.
4. obtain (a substance or resource) from something by a special method
5. a process of purifying something such as water, air, or blood
6. substances such as lipstick or powder, which people put on their face to make themselves look more attractive
7. preventing dryness in the skin
8. tiny holes in the skin
9. a skin condition which causes a lot of spots on the face and neck
10. relating to medicinal drugs, or their preparation, use, or sale

Exercise 2. Match the headings (a-d) with the paragraphs (1-4)

- a. The ways of identification of purification grade of mineral oil.

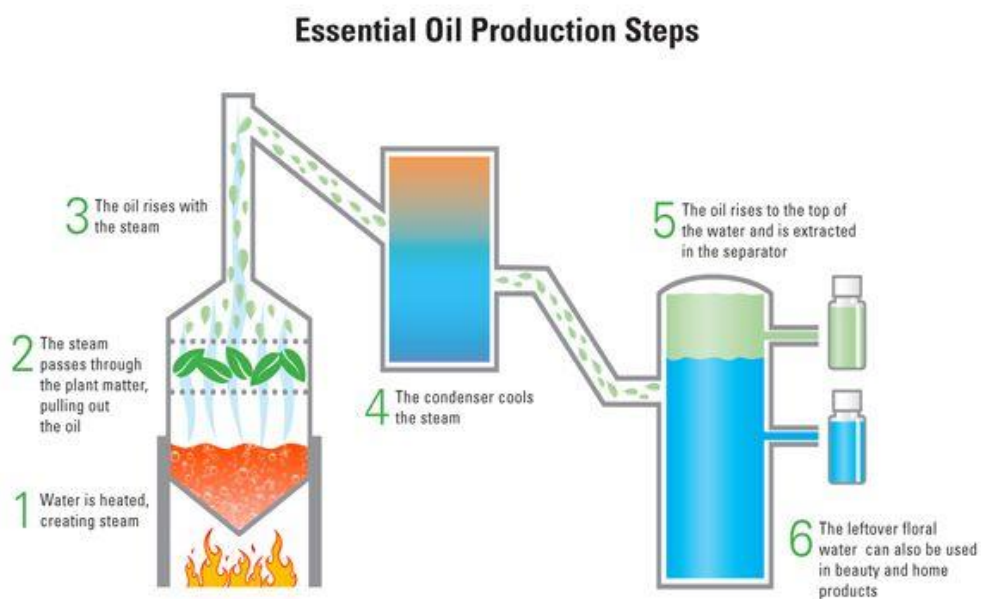
- b. Contradictions about mineral oil.
- c. The main characteristics of mineral oil.
- d. The main reasons why mineral oil is widely used in cosmetology.

Exercise 3. Answer the following questions.

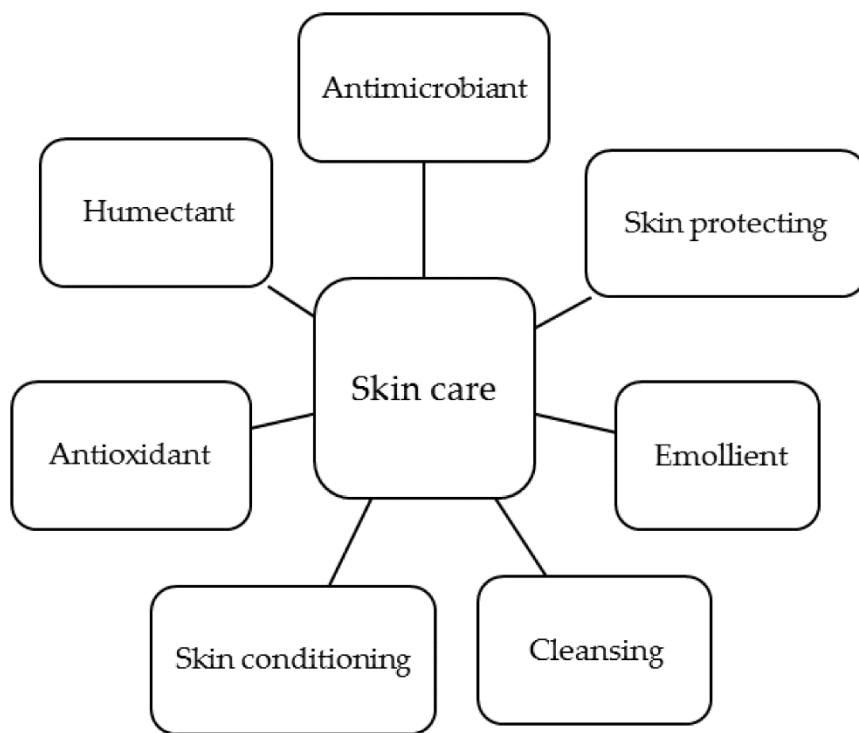
1. Where has mineral oil been used as a common ingredient?
2. What is the advantage of white mineral oil used in cosmetic products over the vegetable oils?
3. What is the result of the purification of mineral oil?
4. What has the main reason for mineral oil been to be recognized as an important part of many cosmetic formulations?
5. Why is mineral oil considered to be “comedogenic”?



Speaking. Work in pairs. Make up a dialogue on the picture and role-play it.



Writing. Exercise 1. Write a short information about skin care products using the cluster below.



Exercise 2. Match the words to make phrases and make up situations with them.

- | | |
|-------------------|---------------|
| 1. mineral | a. oil |
| 2. water | b. loss |
| 3. cosmetic | c. products |
| 4. skin | d. protectant |
| 5. pharmaceutical | e. grade |



Listen. Exercise 1. Fill in the gaps.



perfume.mp3

Who likes perfume? It stinks. It's _____ smells in the world. I hate it when someone walks past _____ perfume or cologne. It makes me feel a little sick and I worry about the chemicals in it. Why do people

_____ much perfume? What's the point? I thought _____ perfume was to _____ our bodies when we didn't take a bath. Everybody showers or takes a bath these days, so there's no need for perfume. It's also _____. How can a tiny bottle of strong-smelling water cost so much? I think the perfume companies are _____ of money. I wonder how many people _____ this. What do you think of perfume? Is it OK for men and women?

Exercise 2. Listen again and unjumble the words.

Who likes perfume? It stinks. smells worst the of one It's in the world. when walks I it someone past hate me with really strong perfume or cologne. It makes me feel a little the sick I about chemicals and worry in it. Why do people need to wear so much perfume? What's the point? I thought to was perfume of idea original the cover the smell of our take bath when didn't a bodies we. Everybody showers or takes a bath these days, so there's no need for perfume. It's money of waste a also. How can a tiny bottle of strong-smelling water cost so much? I think the perfume are amounts making companies huge of money. I wonder how many people agree with me on this. What perfume of think you do? Is it OK for men and women?

PROGRESS CHECK TESTS ON UNIT V

1. Choose the correct answer. Where is wax used?

- A) It is used in the production of candles.
- B) It is used in the production of polishes.
- C) It is used in the production of crayons and impregnating substances.
- D) All are correct.

2. Choose the correct answer. Much of this wax ...from petroleum, which ... the largest single source of hydrocarbon waxes.

- A) come/has
- B) comes/is
- C) comes/was

D) come/is

3. Choose the correct answer. Paraffin rich crude oil is generally considered not quite suitable for ... production.

A) hydrocarbon waxes

B) crayons and impregnating substances

C) candle

D) bitumen

4. Choose the correct answer. ... instance, in order to produce lubricating oil... proper low temperature properties, the wax has to be removed ... the oil.

A) For/with/from

B) For/of/off

C) For/for/from

D) For/from/with

5. Choose the correct antonym to the underlined word. However, the wax content as a rule does not constitute any criteria of usefulness at bitumen production

A) rudeness

B) beautifulness

C) harmfulness

D) kindness

6. Choose the correct answer. Petroleum is widely ... as a resource that ... cars, planes and other vehicles.

A) renowns/powers

B) renowned/powered

C) renowned/powers

D) renowning/powering

7. Choose the correct answer. What is the difference between petroleum and its counterparts such as vegetable and olive oil?

A) Petroleum is used as fuel.

B) Petroleum doesn't go rancid.

C) Petroleum is also found in a myriad of consumables.

D) Petroleum

8. Choose the correct answer. Why is petroleum known as mineral oil in the food industry?

A) Because it can be used as fuel.

B) Because it's lubricating oil.

C) Because it's not a food.

D) Because it's mould free.

9. Choose the correct answer. While regular flour, water, egg, milk and sugar combinations ... bad relatively quickly, mineral oil ... them at their prime for weeks.

A) go/keeps

B) goes/keep

C) go/kept

D) goes/keeps

10. Choose the correct definition to the given word. renown

A) food preserved by canning

B) known or talked about by many people

C) substances used to remove dirt

D) fit for human consumption

11. Choose the correct answer. What does gasoline (petrol) contain?

A) It contains different fuels.

B) It contains diesel fuel and heating oil.

C) It contains benzene and other known carcinogens.

D) It contains hydrocarbon gas liquids.

12. Choose the correct answer. ... is the second most-consumed petroleum product.

A) Propane

B) Diesel fuel

C) Distillate fuel oil

D) Heating oil

13. Choose the correct antonym to the underlined word. Propane, a heavily consumed HGL, is also used in homes for space heating and water heating, for clothes drying, for cooking.

- A) hardly
- B) lightly
- C) rarely
- D) finally

14. Choose the correct answer. Gasoline (petrol) ... in internal combustion engines can ... significant effects on the local environment.

- A) uses/has
- B) used/had
- C) used/have
- D) using/having

15. Choose the correct definition to the given word. emission

- A) the production and discharge of something, especially gas or radiation
- B) the circumstances, objects, or conditions by which one is surrounded
- C) an industry branch that produces organic intermediate products
- D) a gas obtained from petroleum, used in its liquid form as a fuel

16. Choose the correct answer. What are the advantages of mineral oil?

- A) It's a by-product of the distillation of petroleum to produce gasoline.
- B) It's lightweight and inexpensive, and helps reduce water loss from the skin.
- C) It's long been used as a common ingredient in lotions, creams, ointments, and cosmetics.
- D) It's colorless and odorless.

17. Choose the correct answer. Mineral oil ... in cosmetic products ... from the petroleum and highly purified.

- A) used/is extracted
- B) used/is extracting
- C) is used/is extracted
- D) uses/extracts

18. Choose the correct answer. The purification ... mineral oil results ... a liquid of sufficiently high quality

- A) of/from
- B) of/in
- C) on/in
- D) from/at

19. Choose the correct antonym to the underlined word. Mineral oil has long been recognized as an important part of many cosmetic formulations.

- A) purified
- B) ignored
- C) refined
- D) admitted

20. Choose the correct definition to the given phrase. mineral oil

- A) a scented oil added to your bath water
- B) a thick, smooth liquid preparation designed to be applied to the skin for medicinal or cosmetic purposes
- C) a substance that provides protection, e.g. against disease or ultraviolet radiation
- D) a clear, colourless, oily liquid that is a by-product of the distillation of petroleum

TEXTS FOR ADDITIONAL READING

TEXT 1. PRESIDENTIAL DECREE OF THE REPUBLIC OF UZBEKISTAN

of April 28, 2000 No. UP-2598

About measures for attraction of direct foreign investments in exploration and production of oil and gas

For the purpose of increase in efficiency of search and prospecting works, growth in volumes of explored reserves of hydrocarbon raw materials and creating favorable conditions for attraction of direct foreign investments in oil-and-gas sector of economy of the republic:

1. Determine that intensive carrying out search and prospecting works in the Ustyurt region and other perspective oil-and-gas areas of the republic, broad attraction for this purpose of direct foreign investments is the major priority in development of oil and gas industry of the Republic of Uzbekistan.

2. Determine that newly opened oil and gas fields in the Ustyurt region can be provided to the foreign companies which carried out exploration works on the specified fields in development on the terms of concessions, for a period of up to 25 years, with the right of prolongation of term of development.

3. Provide to the foreign companies attracted to conducting search and prospecting works on oil and gas, the most favored nation treatment providing:

- exclusive right on carrying out in certain territory of search and prospecting works with the subsequent development of any of revealed in the specified territory of fields by creation of joint business or on the terms of concession;

- the privilege to provision of the new territory for continuation of search and prospecting works in case of not identification in the territories, contractual on carrying out these works, the resources having industrial value;

- the property right and free export provided by constituent documents of joint business or the concession treaty of part of the extracted hydrocarbons, and also products of their conversion on tolling basis;

- guarantee for compensation of the actual costs for search and prospecting works in case of discovery of the fields having industrial value in cases of their transfer for further development to Uzbekneftegaz Joint-stock company.

4. Exempt the foreign companies which are carrying out search and prospecting works on oil and gas, and also the foreign contract and subcontract organizations attracted by them from payment:

- the income tax (except for the drawn interest from the means placed in commercial banks), the property tax from legal entities, the land tax from legal entities, tax for use of water resources, for conducting exploration works;

- customs payments (except the value added tax and charges for customs clearance) when importing the equipment, material resources and services necessary for carrying out the search, prospecting and other accompanying works.

5. Ceased to be valid according to the Presidential decree of the Republic of Uzbekistan of 19.06.2020 No. UP-6011

6. Determine that:

- the general duration of the search and prospecting works which are carried out on exclusive basis by the foreign companies in the stipulated territories cannot exceed 5 years;

- in case of identification of the areas which are of interest to further conducting exploration works, the foreign companies are given opportunity of continuation of works within these areas up to 3 more years;

- the foreign companies provide use of natural resources according to purpose, completeness of geological studying, rational, complex use and protection of subsoil.

7. Ceased to be valid according to the Presidential decree of the Republic of Uzbekistan of 19.06.2020 No. UP-6011

8. Permit the Cabinet of Ministers to provide in some cases:

- to the foreign companies which are engaged in search, exploration and production of oil and gas in the Republic of Uzbekistan, additional benefits and preferences;

- concessions on the basis of direct negotiations between authorized body and the strategic investor without carrying out tenders and auctions.

9. Assign to the Department of Energy of the Republic of Uzbekistan functions of authorized body on regulation of oil and gas activities (search, investigation, oil and gas extraction) in the territory of the Republic of Uzbekistan and public administration by the concessionary relations in oil and gas industry with the right, according to the decision of the Cabinet of Ministers:

- the conclusions of contracts for conducting oil and gas activities, control of their realization and observance established by the legislation and contracts of conditions of activities.

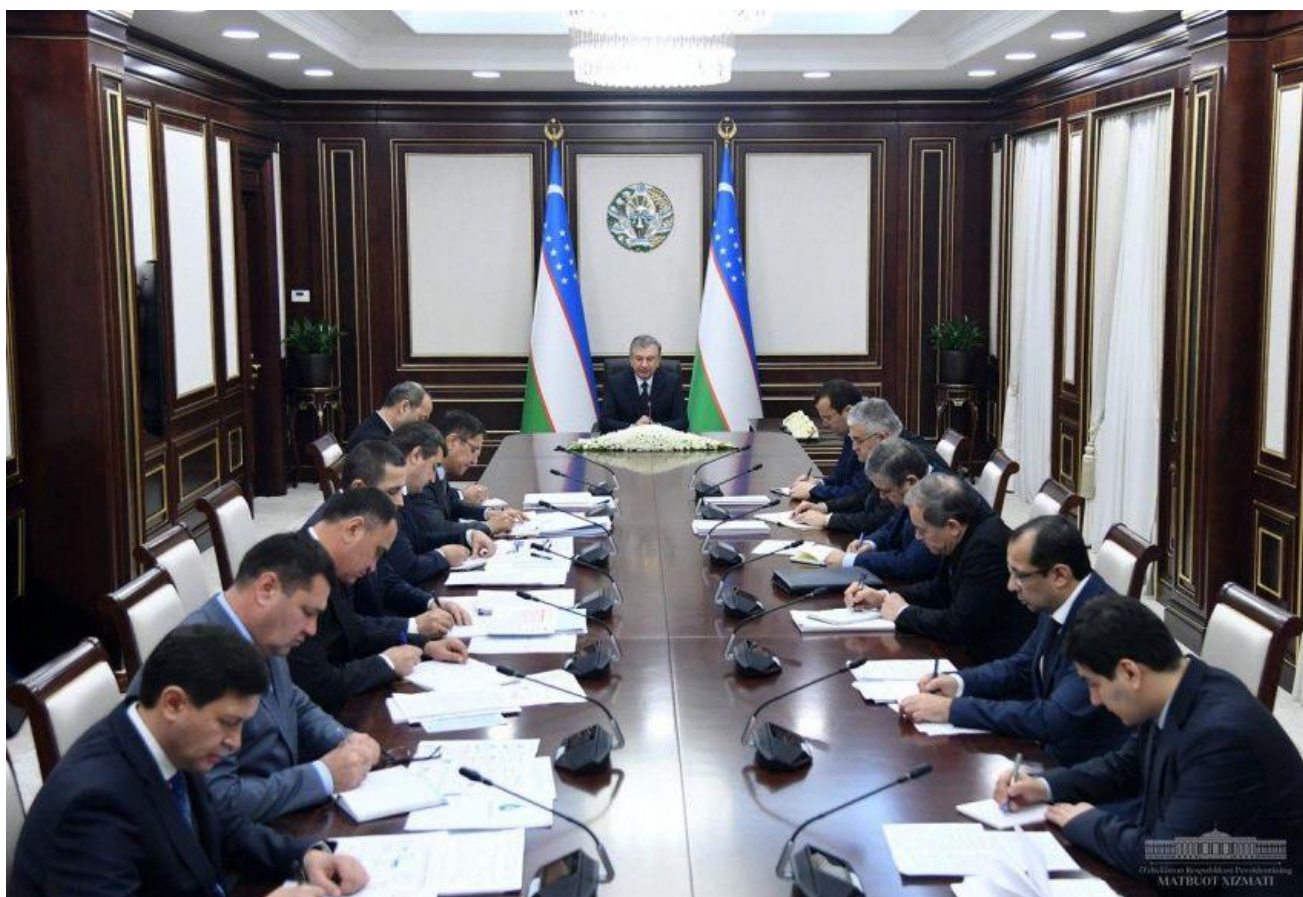
10. Grant to Uzbekneftegaz Joint-stock company the right to transfer to the international consultants and foreign investors, on the basis of confidentiality agreements, information on oil and gas fields including data on their location, the inventories, the production amounts, quantity operated, which are in capital repairs and preservation of wells.

11. National holding company "Uzbekneftegaz" to develop and submit in accordance with the established procedure for approval in the Cabinet of Ministers the program of exploration works for 2000-2005.

12. To provide to broadcasting company of Uzbekistan, National news agency of Uzbekistan, Zhakhon news agency, the Russian Federation State Committee for Publishing and Printing of the Republic of Uzbekistan extended coverage of perspectives of development of oil and gas industry of Uzbekistan in mass media, including foreign.

13. To the Cabinet of Ministers of the Republic of Uzbekistan in ten-day time to accept the resolution on implementation of this Decree.

TEXT 2. New tasks contemplated to increase hydrocarbons production



On February 6, President of the Republic of Uzbekistan Shavkat Mirziyoyev held a meeting to discuss the efficiency indicators in the oil and gas industry and tasks to increase the production of natural gas and liquid hydrocarbons this year.

The oil and gas industry is vital for providing the population and economic sectors not only with energy resources, but also with raw materials for the production of many types of products. In this regard, programs are being realized to spearhead

profound structural transformation and boost the competitiveness of this industry and the energy sector as a whole, as well as geology. In particular, the management system in the joint-stock company Uzbekneftegaz has been improved, the joint-stock companies Uztransgaz and Hududgaztaminot in its composition were reorganized as separate independent entities.

The presidential decree on measures to improve the organization and conduct of geological exploration for oil and gas, signed 18 November 2019, defines all the required organizational and financial conditions for identifying new fields and bolstering the hydrocarbons base.

President Shavkat Mirziyoyev in his recent Address to the Oliy Majlis noted that in the oil and gas sector, with the participation of foreign experts, it is crucial to increase the efficiency in managing state-owned enterprises and optimize costs, and achieve debt reduction. Priority tasks in this direction were also set for the newly approved government.

The meeting participants examined the measures to be implemented in the oil and gas sector this year.

Despite steadfast efforts, systemic problems persist in the sphere and negatively affect the development of other industries.

“We all need to realize one thing. Last year, a lot was said about the shortcomings in the oil and gas sector. But now we must move on to practical matters on the ground. Either we will help the leadership of the industry and get it out of the swamp, or it will pull our economy down and ruin all our plans for economic growth,” the President said.

The President pointed to the insufficiency in the modernization of enterprises, high losses and frequent interruptions in gas delivery.

The Ministry of Energy has been tasked with boosting production by more than 4 billion cubic meters of natural gas this year compared to 2019 volumes for the

sustainable supply of fuel to industries and the population. Instructions were given on reducing technological losses and production costs.

The head of state noted the need to attract international consulting companies into the activities of a design office for reforming the hydrocarbon sector, linking the wages of enterprise managers with key performance indicators (KPI). Shavkat Mirziyoyev urged to introduce anti-corruption compliance control in all enterprises.

Uzbekneftegaz got instructed to critically analyze the condition of each field and ensure increase in gas production.

The President emphasized the necessity in completing the implementation of three projects for the construction and modernization of installations for the separation of propane-butane mixture in order to meet the needs of the population in liquefied gas.

Instructions were given to complete the construction of a synthetic liquid fuel (GTL) plant at the Shurtan Gas Chemical Complex, as well as to introduce digital field systems and automated economic management and resource accounting at the enterprises of the industry.

The joint-stock companies Uztransgaz and Hududgaztaminot were entrusted with the task of ensuring – by July this year – the connection of 2.5 thousand ‘big’ consumers to the online natural gas consumption metering system. The President suggested that modern electronic gas meters be installed for at least 2 million consumers in the framework of automation of inspection and metering of use.

Executives responsible for accelerating the implementation of measures discussed at the meeting have been identified.

TEXT 3. A new Ministry of Energy of Uzbekistan

On February 1, 2019 The President of Uzbekistan signed the decree and resolution on the establishment of a new Ministry of Energy. These novelties aim to reform the country’s Oil & Gas and Power sectors. Remarkably, and for the first time, the Government is bringing the Oil & Gas and Power sectors under a single ministry,

which is largely logical and natural, considering that more than 80 percent of the country's power production relies on natural gas.

The main tasks of the new Ministry are:

1. To develop and implement a single state policy in the Oil & Gas and Power industry aimed to ensure the country's energy security;
2. To provide a sustainable supply to industries and consumers of fuel and energy resources, wide promotion and development of renewable energy sources;
3. To implement state regulation of the production, transmission, distribution and consumption of electric and thermal energy and coal, as well as the extraction, processing, transportation, distribution, sale and use of Oil & Gas and their products;
4. To implement a single regulatory and technical regulation of the power sector in Uzbekistan;
5. To create and develop a balanced system of strategic planning and development of the Oil & Gas and Power complex, increasing and diversifying the production of energy resources;
6. To increase the investment attractiveness of the fuel and energy industry through the development of PPPs;
7. To improve the tariff policy stimulating the formation of a favorable competitive and business environment in the energy market;
8. To coordinate the implementation of investment projects in the fuel and energy industry;
9. To involve private capital actively in the processes of extracting and producing energy resources, establishing cooperation with international financial institutions, donor countries, companies, banks and other structures.

In addition, as the authorized state agency, the Ministry is responsible for the implementation of:

- Production sharing agreements on issues related to its main activities;
- A unified state policy in the use of renewable energy sources;
- A unified state policy and strategic directions in the development and use of nuclear energy;

- Modern energy-efficient and energy-saving technologies in government agencies and organizations, as well as monitoring the efficiency of energy consumption.

In this regard, the “National Energy Saving” company is to be liquidated. The following institutions previously subordinated to the Cabinet of Ministers were transferred to the structure of the Ministry of Energy:

- Atomic Energy Development Agency - Uzatom;
- Inspectorate for the control of the use of petroleum products and gas (previously – the State Inspectorate for the control of the use of petroleum products and gas);
- Inspection on control in electric power industry (previously – the State inspection on supervision in electric power industry).

TEXT 4. Oil and gas sector

Activities in the oil and gas sector cover the entire chain of oil and gas operations from geological exploration; development of oil and gas fields; drilling; and production to processing of hydrocarbons; production of petroleum products; oil and gas and chemical equipment; and providing consumers with petroleum products.

In the sector, there are about 30 industrial enterprises that produce goods such as gasoline, diesel fuel, jet fuel, various types of oils, fuel oil, bitumen, polyethylene of various grades, commercial natural and liquefied gas, oil and gas-chemical equipment, gas equipment, and other goods.

The investment policy for the sector is primarily aimed at attracting foreign investment with know-how technologies in order to diversify the sector and ensure in-depth processing of oil and gas resources.

Over the past five years, such strategic facilities as Ustyurt Gas Chemical Complex, Kandym Gas Processing Complex and a number of other industrial ventures have been put into operation.

Implementation of major strategic projects for deep processing of hydrocarbon raw materials continues.

Specifically, in 2020, it is planned to put into operation a plant for the production of gas-to-liquid fuel. The project will produce 1.5 million tons of high-quality gas-to-liquid fuel that meets the requirements of the European “Euro-5” standard through the annual processing of 3.6 billion cubic meters of natural gas.

Along with this, a new Concept for the implementation of an investment project to expand the production capacity of the Shurtan Gas Chemical Complex has been developed. With the implementation of the project, the capacity of the polymer production plant will increase from the current 125,000 tons four-fold, to 500,000 tons. As a result, various opportunities will be created for further development of the petrochemical industry.

Implementation of an investment project is also planned for the modernization of Bukhara Oil Refinery, which will ensure the production of high-quality oil products that meet the Euro-5 standard.

TEXT 5. Priorities in oil and gas industry of Uzbekistan

On November 20, the President of the Republic of Uzbekistan Shavkat Mirziyoyev held a meeting devoted to the discussion of the state of affairs in the oil and gas industry and issues of further development of the industry.

The oil and gas industry has an important place in the economy of the country. It is a key source of raw materials for production of polymers, organic chemicals and nitrogen fertilizers necessary for many sectors of the economy.

Over the past two years, as a result of measures taken in the industry, gas production increased by 10 percent, natural gas supply increased by 15 percent, and liquefied gas by 1.6 times.

During this period, the refineries produced an additional 204 thousand tons of petroleum products, and the domestic market’s demand for petrol and diesel fuel is fully satisfied.

In the current year, polyethylene and polypropylene were produced in Shurtan and Ustyurt gas chemical complexes, the added value of which is 4 times higher than the cost of gas by almost US\$700 million.

For further development of the oil and gas sector until 2030, it is planned to implement 30 investment projects worth US\$36.5 billion in geological exploration, production and deep processing of hydrocarbons.

It was noted at the meeting that if specific measures will not be taken to increase hydrocarbon reserves, the existing reserves will be halved over the next 10-15 years.

In this regard, the leadership of Uzbekneftegaz was instructed to expand the scope of geological exploration and increase production volumes, modernize existing and open new fields, deeply process oil and gas resources, and expand investment attraction. Instructions were given for broader attraction of investors to exploration and production based on international experience, development of new mechanisms aimed at ensuring equal protection of the interests of the state and investors.

At the same time, instructions were given to submit, by the end of this year, proposals for implementation and financing of the second phase of the program for hydrocarbons extraction in 2017–2021.

It was noted that the main part of gas pipelines and gas distribution system is in need of repair. In order to guarantee the supply of consumers with natural gas, a project worth US\$1.6 billion will be implemented to modernize the gas trunkline system and control gas flows (SCADA).

In addition, instructions were given to attract foreign investments and loans for financing projects on modernizing the gas distribution system and introducing an automated system for monitoring and metering gas consumption.

Currently, the oil and gas industry is deeply processed to produce products with a high added value of only 2 percent of natural gas, there are all opportunities to

increase this figure by 7 times over the next 10 years. In this regard, at the meeting it was noted that Uzbekneftegaz JSC should give priority attention to oil and gas chemistry.

In particular, there are opportunities for production of new types of products – polystyrene, PET (polyethylene terephthalate) and synthetic rubbers based on aromatic hydrocarbons (benzene, toluol, xylol) and using the technology of producing olefins from methanol, as well as increasing the production of polyethylene and polypropylene. For the implementation of these projects it is necessary to attract about U\$9 billion.

To this end, a strategy will be developed for implementation of projects involving direct investments from large companies of Europe, Japan, the United States, and the United Arab Emirates.

The fact was criticized that due to excessive complexity and multi-stage management system of Uzbekneftegaz, reforms in the industry are progressing slowly.

In order to improve the management system, instructions were given on optimizing the organizational structure of Uzbekneftegaz and removing non-core organizations from the system. In particular, it was emphasized that management should be reduced with duplicate functions, service companies and subsidiary industries should be transferred to investors on the basis of public-private partnership.

Instruction was given to organize a national oil and gas research institute on the basis of four scientific-research, research and design institutes operating in this sphere, to pay special attention to development and implementation of innovative solutions for deep processing of hydrocarbons.

TEXT 6. Holding company Uzbekneftegaz

The national holding company **Uzbekneftegaz** is a state-owned holding company of Uzbekistan's oil and gas industry.

Uzbekneftegaz was established on May 3, 1992. In 1998, it was transformed into national holding company.

Uzbekneftegaz leads a consortium of Korea National Oil Corporation, China National Petroleum Corporation and Lukoil exploring and developing gas condensate fields in the Aral Sea.^[1] In February 2008, Uzbekneftegaz and consortium led by the Korea Gas Corporation established the joint venture Uz-Kor Gas Chemical to develop the Surgil gas field, containing about 133 billion cubic metres (4.7 trillion cubic feet) of natural gas, and build the Ustyurt gas-chemical complex.^[2] It will produce 4 billion cubic metres (140 billion cubic feet) of gas per year and about 500,000 tons per year of plastics as well as 100,000 tons of petrol which is derived as a bi-product in the process.

Together with another Korean company, Korea National Oil Corporation, Uzbekneftegaz explores Namangan-Tergachi and Chust-Pap oil fields in eastern Uzbekistan.^[4] In August 2008, Uzbekneftegaz signed a cooperation agreement with Petrovietnam.^[5] It also cooperates with Lukoil in the Kandym-Khausak-Shady-Kungrad project to develop several natural gas fields in Uzbekistan.^{[6][7]}

Uzbekneftegaz together with China National Petroleum Corporation owns and operates the Uzbek section of the Central Asia–China gas pipeline.^[8] They also have a joint venture for developing the Mingbulak oilfield.^[9]

Together with Sasol and Petronas, Uzbekneftegaz develops Uzbekistan GTL, a gas-to-liquids (GTL) project.

In addition, Uzbekneftegaz has a production sharing agreement with Gazprom on gas exploration, joint ventures with Prista Oil on motor oil and lubricants production, and with Ariston Thermo on heating boilers production.

GRAMMAR REFERENCE

Simple Tenses in the Active and Passive Voices

Present Simple

Active	Passive	Usage
<p>(a) Water consists of hydrogen and oxygen.</p> <p>(b) The average person breathes 21,600 times a day.</p> <p>© The world is round.</p>	<p>Water is used in everyday life.</p> <p>Soil is cultivated for a good crop.</p>	<p>The simple present says that something was true in the past, is true in the present, and will be true in the future.</p> <p>It expresses general statements of fact and timeless truths.</p>
<p>(d) I study for two hours every night.</p> <p>(e) I get up at seven every morning.</p> <p>(f) He always eats a</p>	<p>I often invited to conferences.</p> <p>Bread is eaten every day.</p>	<p>The simple present is used to express habitual or everyday activities.</p>

Past Simple

Active	Passive	Usage
<p>(a) I walked to school yesterday.</p> <p>(b) John lived in Paris for ten years, but now he lives in Rome.</p> <p>© I bought a new car three days ago.</p>	<p>This house was built last year.</p> <p>This car was sold three days ago.</p>	<p>The simple past indicates that an activity or situation began and ended at a particular time in the past.</p>

(d) Rita stood under a tree when it began to rain.	When a strange noise was heard, Rita got up to investigate.	If a sentence contains when and has the simple past in both clauses, the action in the when clause happens first. In (d): 1st: The rain began. 2nd: She stood under a tree.
(e) When Mrs. Chu heard a strange noise, she got up to investigate.	When the cup was dropped, the coffee spilled on my lap.	

Progressive Tenses in the Active and Passive Voices

Present Progressive Tense

Active	Passive	Usage
(a) John is sleeping right now. (b) I need an umbrella because it is raining. © The students are sitting at their desks right now.	Dinner is being made now. The lecture is being delivered for the students now.	The present progressive expresses an activity that is in progress at the moment of speaking. It is a temporary activity that began in the past, is continuing at present, and will probably end at some point in the future.
(d) I am taking five courses this semester. (e) John is trying to improve his work habits. (f) Susan is writing another book this year.	A new school is being built in our street.	Often the activity is of a general nature: something generally in progress this week, this month, this year. Note (1): The sentence means that writing a book is a general activity Susan is engaged in at present, but it does not mean that at the moment of speaking she is sitting at her desk with pen in hand.

Past Progressive Tense

Active	Passive	Usage
(a) I was walking down the street when it began to rain.	When I came home dinner was being cooked.	In (g): 1st: I was walking down the street.
(b) While I was walking down the street, it began to rain.	While the student was being examined someone entered the room.	2nd: It began to rain. Both actions occurred at the same time, but one action began earlier and was in progress when the other action occurred.
© Rita was standing under a tree when it began to rain.	Last year at this time a theatre was being built in our city.	In (j): My studying began before 8:00, was in progress at that time, and probably continued.
(d) At eight o'clock last night, I was studying.		
(e) Last year at this time, I was attending school.		
(f) While I was studying in one room of our apartment, my roommate was having a party in the other room.	While the telegramme was being sent by the e-mail on this computer other computers were being repaired.	Sometimes the past progressive is used in both parts of a sentence when two actions are in progress simultaneously.

Perfect Tenses in the Active and Passive Voices

Present Perfect

Active	Passive	Usage
(a) They have moved into a new apartment.	A new apartment has been built in our street.	The present perfect expresses the idea that something happened (or never happened) before now, at an unspecified time in the past. The exact time it happened is not important.
(b) Have you ever visited Mexico?	Bread has never been sold in this store.	If there is a specific mention of time, the simple past is
(c) I have never seen snow.	The letter has not been sent yet.	
(d) I have already seen that movie.	Have you ever been	

<p>(e) Jack hasn't seen it yet.</p> <p>(f) Arm started a letter to her parents last week, but she still hasn't finished it.</p> <p>(g) Alex feels bad. He has just heard some bad news.</p>	<p>invited to the scientific conference?</p>	<p>used: They moved into a new apartment last month.</p> <p>Notice in the examples: the adverbs ever, never, already, yet, still, and just are frequently used with the present perfect.</p>
<p>(h) We have had four tests so far this semester.</p> <p>(i) I have written my wife a letter every other day for the last two weeks.</p> <p>(j) I have met many people since I came here in June.</p> <p>(k) I have flown on an airplane many times.</p>	<p>A lot of students have been examined so far today.</p> <p>One faculty has been opened since he entered the institute.</p>	<p>The present perfect also expresses the repetition of an activity before now. The exact time of each repetition is not important.</p> <p>Notice in (h): so far is frequently used with the present perfect.</p>
<p>(l) They have been here since seven o'clock.</p> <p>(m) We have been here for two weeks.</p> <p>(n) I have had this same pair of shoes for three years.</p> <p>(o) I have liked cowboy movies ever since I was a child.</p> <p>(p) I have known him for many years.</p>	<p>Four books have been written since September.</p> <p>English has been taught at this school for the last ten years.</p>	<p>The present perfect, when used with for or since, also expresses a situation that began in the past and continues to the present. *</p> <p>In the examples, notice the difference between since and for: since + a particular time for + a duration of time</p>

Past Perfect

Active	Passive	Usage
(a) Sam had already left by the time Ann got there.	Dinner had been made by the time the guests came.	The past perfect expresses an activity that was completed before another activity or time in the past.
(b) The thief simply walked in. Someone had forgotten to lock the door.	Mother got angry. Because the dishes had been left unwashed.	
© Sam had already left when Ann got there.	When he came into the class room the theme had already been explained.	In (c): First: Sam left. Second: Ann got there.*
(d) Sam had left before Ann got there. (e) Sam left before Ann got there. (f) After the guests had left, I went to bed. (g) After the guests left, I went to bed.	The theme had been explained before the students left the class room. After the theme had been explained the students left the class room.	If either before or after is used in the sentence, the past perfect is often not necessary because the time relationship is already clear. The simple past may be used, as in (e) and (g). Note: (d) and (e) have the same meaning; (f) and (g) have the same meaning.

Countable and non-countable nouns

I bought a chair. Sam bought three chairs. We bought some furniture. incorrect: We bought some furnitures. incorrect: We bought a furniture.			Chair is a count noun; chairs are items that can be counted. Furniture is a noncount noun. In grammar, furniture cannot be counted.
COUNT	a chair one chair	0 chairs* two chairs some chairs a lot of	A count noun: may be preceded by a/an in the singular.
NONCOUNT	0 furniture* some furniture a		A noncount noun: is not immediately preceded by a/an.

Non-count nouns

<p>(a) I bought some chairs, tables, and desks. In other words, I bought some furniture.</p> <p>(b) I put some sugar in my coffee.</p>	<p>Many noncount nouns refer to a “whole” that is made up of different parts.</p> <p>In (a): furniture represents a whole group of things that is made up of similar but separate items.</p> <p>In (b): sugar and coffee represent whole masses made up of individual particles or elements.¹</p>
<p>(c) I wish you luck.</p>	<p>Many noncount nouns are abstractions. In (c): luck is an abstract concept, an abstract “whole.” It has no physical form; you can’t touch it. You can’t count it.</p>
<p>(d) Sunshine is warm and cheerful.</p>	<p>A phenomenon of nature, such as sunshine, is frequently used as a noncount noun, as in (d).</p>
<p>(e) noncount: Ann has brown hair.</p> <p>count: Tom has a hair on his jacket.</p> <p>(f) noncount: I opened the curtains to let in some light.</p> <p>count: Don’t forget to turn off the light</p>	<p>Many nouns can be used as either noncount or count nouns, but the meaning is different; e.g., hair in (e) and light in (f).</p> <p>(Dictionaries written especially for learners of English as a second language are a good source of information on count/noncount usages of nouns.)</p>

*To express a particular quantity, some noncount nouns may be preceded by unit expressions: a spoonful of sugar, a glass of water, a cup of coffee, a quart of milk, a loaf of bread, a grain of rice, a bowl of soup, a bag of flour, a pound of meat, a piece of furniture, a piece of paper, a piece of jewelry.

Some common non-count nouns

This list is a sample of nouns that are commonly used as noncount nouns. Many other nouns can also be used as noncount nouns.

(a) whole GROUPS made up of SIMILAR items: baggage, clothing, equipment, food, fruit, furniture, garbage, hardware, jewelry, junk, luggage, machinery, mail, makeup, money I cash!change, postage, scenery, traffic, etc.

(b) fluids: water, coffee, tea, milk, oil, soup, gasoline, blood, etc.

© SOLIDS: ice, bread, butter, cheese, meat, gold, iron, silver, glass, paper, wood, cotton, wool, etc.

(d) GASES: steam, air, oxygen, nitrogen, smoke, smog, pollution, etc.

(e) particles: rice, chalk, corn, dirt, dust, flour, grass, hair, pepper, salt, sand, sugar, wheat, etc.

(f) abstractions:

—beauty, confidence, courage, education, enjoyment, fun, happiness, health, help, honesty, hospitality, importance, intelligence, justice, knowledge, laughter, luck, music, patience, peace, pride, progress, recreation, significance, sleep, truth, violence, wealth, etc.

—advice, information, news, evidence, proof, etc.

—time, space, energy, etc.

—homework, work, etc.

—grammar, slang, vocabulary, etc.

(g) languages: Arabic, Chinese, English, Spanish, etc.

(h) FIELDS OF STUDY: chemistry, engineering, history, literature, mathematics, psychology, etc.

(i) recreation: baseball, soccer, tennis, chess, bridge, poker, etc.

(j) activities: driving, studying, swimming, traveling* walking, etc. (and other gerunds)

(k) natural phenomena: weather, dew, fog, hail, heat, humidity, lightning, rain, sleet, snow, thunder, wind, darkness, light, sunshine, electricity, fire, gravity, etc.

Plural of nouns. Regular and irregular plural nouns

(a) song-songs	The plural of most nouns is formed by adding final -s.
(b) box-boxes	Final -es is added to nouns that end in -sh, -ch, -s, -z, and -x
(c) baby-babies	The plural of words that end in a consonant + -y is spelled -ies
(d) man-men, ox-oxen, tooth-teeth, woman-women, foot-feet, mouse-mice, child-children, goose-geese, louse-lice	The nouns in (d) have irregular plural forms that do not end in -s.
(e) echo-echoes potato-potatoes hero-heroes tomato-tomatoes	Some nouns that end in -o add -es to form the plural.
(f) auto-autos photo-photos studio-studios ghetto-ghettos piano-pianos tatoo-tatoos kangaroo-kangaroos radio-radios video-videos kilo-kilos solo-solos zoo-zoos memo-memos	Some nouns that end in -o add only -s to form the plural.
(g) memento-mementoes /mementos volcano-volcanoes/volcanos mosquito-mosquitoes/mosquitos zero-zeroes/zeros tornado - tornadoes/tornados	Some nouns that end in -o add either -es or -s to form the plural (with -es being the more usual plural form).
(h) calf-calves, life-lives, thief-thieves, half-halves, loaf-loaves, wolf-wolves, knife-knives, self-selves, scarf-scarves/scarfs, leaf-leaves, shelf-shelves	Some nouns that end in -f or -fe are changed to -ves to form the plural.
(i) belief-beliefs, cliff-cliffs, chief-chiefs, roof-roofs	Some nouns that end in -f simply add -s to form the plural.
(j) one deer-two deer, one series-two series, one fish-two fish, one sheep-two sheep, one means-two means, one shrimp-two shrimp, one offspring-two offspring, one species-two species	Some nouns have the same singular and plural form: e.g., One deer is Two deer are

(k) criterion-criteria (o) analysis-analyses phenomenon-phenomena basis-bases crisis-crises (1) cactus-cacti-cactuses, hypothesis-hypotheses, fungus-fungi, oasis-oases, nucleus-nuclei , parentheses-parentheses, stimulus-stimuli, thesis-theses syllabus-syllabii syllabuses, (p) bacterium-bacteria (m) formula-formulae /formulas, curriculum-curricula, vertebra-vertebrae, datum—data, (n) appendix-appendices, appendixes, medium-media, index-indices /indexes, memorandum-memoranda,	Some nouns that English has borrowed from other languages have foreign plurals.
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Infinitive

(a) He came here in order to study English. (b) He came here to study English.	In order to is used to express purpose. It answers the question “Why?” In order is often omitted, as in (b).
(c) incorrect: He came here for studying English. (d) incorrect: He came here for to study English.	To express purpose, use (in order) to, not for, with a verb.*
(e) incorrect: He came here for a study. (f) I went to the store for some bread. (g) I went to the store to buy some bread.	For can be used to express purpose, but it is a preposition and is followed by a noun object, as in (f).

Exception: The phrase be used for expresses the typical or general purpose of a thing. In this case, the preposition for is followed by a gerund: A saw is used for cutting wood. Also possible: A saw is used to cut wood.

However, to talk about a particular thing and a particular situation, be used + an infinitive is used: A chain saw was used to cut (NOT for cutting) down the old oak tree.

Reference list of verbs followed by infinitive

Verbs with a bullet (•) can also be followed by gerunds.

A. VERBS FOLLOWED IMMEDIATELY BY AN INFINITIVE

1. afford	I can't afford to buy it.	24. love'	I love to go to operas.
2. agree	They agreed to help us.	25. manage	She managed to finish her <i>work early</i>
3. appear	She appears to be tired.	26. mean	I didn't mean to hurt your
4. arrange	I'll arrange to meet you at airport.	27. need	I need to have your opinion.
5. ask	He asked to come with us.	28. offer	They offered to help us.
6. can't bear	I can't bear to wait in long	29. plan	I am planning to have a
7. beg	He begged to come with us.	30. prefer*	Ann prefers to walk to
8. begin•	It began to rain.	31. prepare	We prepared to welcome
9. care	I don't care to see that show.	32. pretend	He pretends not to
10. claim	She claims to know a star.	33. promise	I promise not to be late.
11. consent	She finally consented to	34. refuse	I refuse to believe his story.
12.	He continued to speak.	35. regret'	I regret to tell you that you
13. decide	I have decided to leave on	36.	I remembered to lock the
14. demand	I demand to know who is	37. seem	That cat seems to be
15. deserve	She deserves to win the	38. can't	I can't stand to wait in long
16. expect	I expect to enter graduate the fall.	39. start'	It started to rain.
17. fail	She failed to return the book, library on time.	40. struggle	I struggled to stay awake.
18. forget•	I forgot to mail the letter.	41. swear	She swore to tell the truth.
19. hate•	I hate to make silly mistakes.	42. threaten	She threatened to tell my
20. hesitate	Don't hesitate to ask for my	43. try'	I'm trying to learn English.
21. hope	Jack hopes to arrive next	44. volunteer	He volunteered to help us.
22. learn	He learned to play the piano.	45. wait	I will wait to hear from you.
23. like'	I like to go to the movies.	46. want	I want to tell you
		47. wish	She wishes to come with us.

B. VERBS FOLLOWED BY A (PRO)NOUN + AN INFINITIVE

48. advise'	She advised me to wait until tomorrow.	61. instruct	He instructed them to be
		62. invite	Harry invited the Johnsons

49. allow	She allowed me to use her		his party.
50. ask	I asked John to help us.	63. need	We needed Chris to help us
51. beg	They begged us to come.		the solution.
52. cause	Her laziness caused her to	64. order	The judge ordered me to
53.	She challenged me to race	65. permit	He permitted the children to
	corner.		late.
54. convince	I couldn't convince him to	66. persuade	I persuaded him to come for
	help.	67. remind	She reminded me to lock the
55. dare	He dared me to do better	68. require	Our teacher requires us to
	done.	69. teach	My brother taught me to
56.	He encouraged me to try	70. tell	The doctor told me to take
57. expect	I expect you to be on time.		pills.
58. forbid	I forbid you to tell him.	71. urge	I urged her to apply for the
59. force	They forced him to tell the	72. want	I want you to be happy.
60. hire	She hired a boy to mow the	73. warn	I warned you not to drive
	lawn.		too fast.

SOME COMMON ADJECTIVES FOLLOWED BY INFINITIVES

glad to (do it)			careful to	surprised to*
happy to	sad to*	prepared to	hesitant to	amazed to*
pleased to	upset to*	anxious to	reluctant to	astonished to*
delighted to	disappointed	eager to	afraid to	shocked to*
content to	relieved	proud to	willing to	likely to certain
to	lucky to	ashamed to	determined to	stunned to*
fortunate to			to	
			motivated to	

Using infinitive with too and enough

COMPARE	In the speaker's mind, the use of too implies a negative result.
(a) That box is too heavy for Bob to lift.	
(b) That box is very heavy, but Bob can lift it.	In (a): too heavy = It is impossible for Bob to lift that box. In (b): very heavy = It is possible but difficult for Bob to lift that box.
© I am strong enough to lift that box. I can lift it.	Enough follows an adjective, as in (c). Usually enough precedes a noun, as in (d).
(d) I have enough strength to lift that box.	In formal English, it may follow a noun, as in (e).

Passive and past forms of infinitive

	SIMPLE	PAST
ACTIVE	to see	to have seen
PASSIVE	to be seen	to have been seen

PAST infinitive: to have + past participle (a) The rain seems to have stopped.	The event expressed by a past infinitive or past gerund happened before the time of the main verb. In (a): The rain seems now to have stopped a few minutes ago.
passive infinitive: to be + past participle (b) I didn't expect to be invited to his party.	In (b): to be invited is passive. The understood prepositional phrase is "by him": I didn't expect to be invited by him.
past-passive infinitive: to have been + past participle (c) Nadia is fortunate to have been given a scholarship.	In (c): Nadia was given a scholarship last month by her government. She is fortunate. Nadia is fortunate now to have been given a scholarship last month by her government.

*If the main verb is past, the action of the past infinitive happened before a time in the past:

The rain seemed to have stopped. = The rain seemed to have stopped before 6 p.m.

Using passive infinitive following need

(a) I need to borrow some money. (b) John needs to be told the	Usually an infinitive follows need, as in (a) and (b).
(c) The house needs to be painted. (d) The house needs repairing.	In certain circumstances, a gerund may follow need. In this case, the gerund carries a passive meaning. Usually the situations involve fixing or improving something, (c) and (d) have the same meaning.

Using zero infinitive and Participle I after the verbs of perception

(a) I saw my friend run down the street. (b) I saw my friend running down the street. (c) I heard the rain fall on the	Certain verbs of perception are followed by either the simple form or the -ing form of a verb. There is often little difference in meaning between the two forms, except that the -ing form usually gives the idea of “while.” In (b): I saw my friend while she was running down the street.
(e) When I walked into the apartment, I heard my roommate singing in the shower. (f) I heard a famous opera star sing at the concert last night.	Sometimes (not always) there is a clear difference between using the simple form or the -ing form. The use of the -ing form gives the idea that an activity is already in progress when it is perceived, as in (e): The singing was in progress when I first heard it. In (f): I heard the singing from beginning to end. It was not in progress when I first heard it.

VERBS OF PERCEPTION FOLLOWED BY THE SIMPLE FORM OR THE PARTICIPLE I

see, look at, hear, notice, feel,
smell observe, listen to, watch

Using zero infinitive after let and help

<p>(a) My father lets me drive his car.</p> <p>(b) I let my friend borrow my bicycle.</p> <p>© Let's go to a movie.</p>	<p>Let is followed by the simple form of a verb, not an infinitive. incorrect: My father lets me to drive his car.</p>
<p>(d) My brother helped me wash my car.</p> <p>(e) My brother helped me to wash my car.</p>	<p>Help is often followed by the simple form of a verb, as in (d).</p> <p>An infinitive is also possible, as in (e). Both (d) and (e) are correct.</p>

Using infinitive after the causative verbs: have, get, make

<p>(a) I made my brother carry my suitcase.</p> <p>(b) I had my brother carry my suitcase.</p> <p>© I got my brother to carry my suitcase.</p>	<p>Make, have, and get can be used to express the idea that "X" causes "Y" to do something. When they are used as causative verbs, their meanings are similar but not identical. In (a): My brother had no choice. I insisted that he carry my suitcase. In (b): My brother carried my suitcase because I asked him to. In (c): I managed to persuade my brother to carry my suitcase.</p>
<p>FORMS</p> <p>X makes Y do something, (simple form) X has Y do something, (simple form) X gets Y to do something, (infinitive)</p>	
<p>Causative MAKE</p> <p>(d) Mrs. Lee made her son clean his room.</p> <p>(e) Sad movies make me cry.</p>	<p>Causative make is followed by the simple form of a verb, not an infinitive, (incorrect: She made him to clean his room.) Make gives the idea that "X" forces "Y" to do something. In (d): Mrs. Lee's son had no choice.</p>

<p>Causative have</p> <p>(f) I had the plumber repair the leak.</p> <p>(g) Jane had the waiter bring her some tea.</p>	<p>Causative have is followed by the simple form of a verb, not an infinitive, (incorrect: I had him to repair the leak.)</p> <p>Have gives the idea that “X” requests “Y” to do something. In (f): The plumber repaired the leak because I asked him to.</p>
<p>Causative get</p> <p>(h) The students got the teacher to dismiss class early.</p> <p>(I) Jack got his friends to play soccer with him after school</p>	<p>Causative get is followed by an infinitive. Get gives the idea that “X” persuades “Y” to do something. In (h): The students managed to persuade the teacher to let them leave early.</p>
<p>PASSIVE CAUSATIVES</p> <p>(j) I had my watch repaired (by someone),</p> <p>(κ) I got my watch repaired (by someone).</p>	<p>The past participle is used after have and get to give a passive meaning. In this case, there is usually little or no difference in meaning between have and get. In (j) and (κ): I caused my watch to be repaired by someone.</p>

Conditionals

Overview of basic verb forms used in conditional sentences

SITUATION	IF-CLAUSE	RESULT CLAUSE	EXAMPLES
True in the present/ future	simple present	simple present will + simple form	If I have enough time, I watch TV every evening. If I have enough time, I will watch TV later on tonight.
Untrue in the present/	simple past	would + simple form	If I had enough time, I would watch TV now or later on.
Untrue in the past	past perfect	would have + past participle	If I had had enough time, I would have watched TV yesterday.

Zero conditional and conditional I

<p>(a) If I don't eat breakfast, I always get hungry during class.</p> <p>(b) Water freezes or will freeze if the temperature reaches 32°F/0°C.</p> <p>© If I don't eat breakfast tomorrow morning, I will get hungry during class.</p> <p>(d) If it rains, we should stay home.</p> <p>If it rains, I might decide to stay home.</p> <p>If it rains, we can't go.</p> <p>If it rains, we're going to stay home.</p> <p>(e) If anyone calls, please take a message.</p>	<p>In conditional sentences that express true, factual ideas in the present/future, the simple present (not the simple future) is used in the if-clause.</p> <p>The result clause has various possible verb forms. A result clause verb can be: the simple present, to express a habitual activity or situation, as in (a).</p> <p>either the simple present or the simple future, to express an established, predictable fact or general truth, as in (b).</p> <p>the simple future, to express a particular activity or situation in the future, as in (c).</p>
<p>(f) If anyone should call, please take a message.</p>	<p>Sometimes should is used in an if-clause. It indicates a little more uncertainty than the use of the simple present, but basically the meaning of examples (e) and (f) is the same.</p>

Conditional II

<p>(a) If I taught this class, I wouldn't give tests.</p> <p>(b) If he were here right now, he would help us.</p> <p>© If I were you, I would accept their invitation.</p>	<p>In (a): In truth, I don't teach this class.</p> <p>In (b): In truth, he is not here right now.</p> <p>In (c): In truth, I am not you.</p> <p>Note: Were is used for both singular and plural subjects. Was (with I, he, she, it) is sometimes used in informal speech: If I was you, I'd accept their invitation.</p>
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<p>COMPARE</p> <p>(d) If I had enough money, I would buy a car.</p> <p>(e) If I had enough money, I could buy a car.</p>	<p>In (d): The speaker wants a car, but doesn't have enough money. Would expresses desired or predictable results.</p> <p>In (e): The speaker is expressing one possible result. Could = would be able to. Could expresses possible options.</p>
<p>Conditional III</p> <p>(a) If you had told me about the problem, I would have helped you.</p> <p>(b) If they had studied, they would have passed the exam.</p> <p>© If I hadn't slipped on the stairs, I wouldn't have broken my arm.</p>	<p>In (a): In truth, you did not tell me about it.</p> <p>In (b): In truth, they did not study. Therefore, they failed the exam.</p> <p>In (c): In truth, I slipped on the stairs. I broke my arm. Note: The auxiliary verbs are almost always contracted in speech. "If you'd told me, I would've helped you (OR I'd've helped you)."</p>
<p>COMPARE</p> <p>(d) If I had had enough money, I would have bought a car.</p> <p>(e) If I had had enough money, I could have bought a car.</p>	<p>In (d): would expresses a desired or predictable result. In (e): could expresses a possible option; could have bought - would have been able to buy.</p>

Using progressive verbs in conditional sentences

<p>(a) true: It is raining right now, so I will not go for a walk.</p> <p>(b) conditional: If it were not raining right now, I would go for a walk.</p>	
<p>(c) TRUE: I am not living in Chile. I am not working at a bank.</p> <p>(d) conditional: If I were living in Chile, I would be working at a bank.</p>	
<p>(e) true: It was raining yesterday afternoon, so I did not go for a walk.</p> <p>(f) conditional: If it had not been raining, I would have gone for a walk.</p>	

(g) true:	I was not living in Chile last year. I was not working at a bank.
(h) conditional:	If I had been living in Chile last year, I would have been working at a bank.

Mixed conditional

Frequently the time in the if-clause and the time in the result clause are different: one clause may be in the present and the other in the past. Notice that past and present times are mixed in these sentences.	
(a) true: (b) conditional:	<div>(past) (present)</div> <p>I did not eat breakfast several hours ago, so I am hungry now.</p> <p>If I had eaten breakfast several hours ago, I would not be hungry now.</p>
(c) true: (d) conditional:	<div>(present) (past)</div> <p>He is not a good student. He did not study for the test yesterday.</p> <p>If he were a good student, he would have studied for the test yesterday.</p>

Omitting if

(a) Were I you, I wouldn't do that.	<p>With were, had (past perfect), and should, sometimes if is omitted and the subject and verb are inverted.</p> <p>In (a): Were I you - if I were you.</p> <p>In (b): Had I known - if I had known.</p> <p>In (c): Should anyone call = if anyone should call.</p>
(b) Had I known, I would have told you.	
© Should anyone call, please take a message.	

Implied conditions

(a) I -would have gone with you, but I had to study.	Often the if-clause is implied, not stated. Conditional verbs are still used in the result clause. In (a): the implied condition = if I hadn't had to study. In (b): the implied condition = if you hadn't helped me.
(b) I never would have succeeded without your help.	
(c) She ran; otherwise., she would have missed her bus.	Conditional verbs are frequently used following otherwise. In (c), the implied if-clause = if she had not run.

Using as if \ as though

(a) It looks like rain.	Notice in (a): like is followed by a noun object.	
(b) It looks as if it is going to rain.	Notice in (b) and (c): as if and as though are followed by a clause. Notice in (d): like is followed by a clause. This use of like is common in informal English, but is not generally considered appropriate in formal English; as if or as though is preferred, (a), (b), (c), and (d) all have the same meaning.	
© It looks as though it is going to rain.		
(d) It looks like it is going to rain, (informal)		
"true" statement (fact)	VERB FORM AFTER AS IF/AS THOUGH	Usually the idea following as if/as though is "untrue." In this case, verb usage is similar to that in conditional sentences.
(e) He is not a child. She talked to him as if he were a child.		
(f) She did not take a shower When she came in from the rainstorm, she looked with her clothes on. as if she had taken a shower with her clothes on.		
(g) He has met her. He acted as though he had never met her.		
(h) She will be here. She spoke as if she wouldn't be here.		

Using wish

Wish is used when the speaker wants reality to be different, to be exactly the			
	“true” statement	VERB FORM FOLLOWING WISH	Wish is followed by a noun clause. Past verb forms, similar to those in conditional sentences, are used in the noun clause. For example, in (a): would, the past form of will, is used to make a wish about the future. In (d): the simple past (knew) is used to make a wish about the present. In (g): the past perfect (had come) is used to make a wish about the past.
A wish about the future	(a) She will not tell me.	I wish (that) she would tell me.	
	(b) He isn't going to be here.	I wish he were going to be here. I wish she could come tomorrow.	
A wish about the present	(d) I don't know French. (e) It is raining right now.	I wish I knew French. I wish it weren't raining right now. I wish I could speak Japanese.	
A wish about the past	(g) John didn't come. Mary couldn't come.	I wish John had come. I wish Mary could have come.	

**Sometimes in very informal speaking: I wish John would have come.*

Using would to make wishes about the future

(a) It is raining. I wish it would stop. (I want it to stop raining.)	Would is usually used to indicate that the speaker wants something to happen or someone other than the speaker to do something in the future. The wish may or may not come true (be realized).
(b) I'm expecting a call. I wish the phone would ring. (I want the phone to ring.)	
© It's going to be a good party. I wish you would come.	In (c) and (d): I wish you would ... is often used to make a request.
(d) We're going to be late. I wish you would hurry.	

Prepositions

about	at	beyond	into	since	up
above	before	by	like	through	upon
across	behind	despite	near	throughout	with
after	below	down	of	till	within
against	beneath	during	Off	to	without
along	beside	for	on	toward(s)	
among	besides	from	out	under	
around	between	in	over	until	

(a) The student studies in the library.	An important element of English sentences is the prepositional phrase. It consists of a preposition and its object. The object of a preposition is a noun or pronoun. In (a): in the library is a prepositional phrase.
(b) We enjoyed the party at your house.	
© We went to the zoo in the afternoon.	In (c): In most English sentences, “place” comes before “time.” In (d): Sometimes a prepositional phrase comes at the beginning of a sentence.
(d) In the afternoon, we went to the zoo.	

Subjunctive mood

<p>Eg. It is desirable that he come today.</p> <p style="padding-left: 40px;">It was necessary that they take steps immediately.</p>	<p>In the subject subordinate clause beginning with that. Here the predicate of the main clause is expressed by the verb to be and the following adjectives and adverbs: advised, important, mandatory, necessary, obligatory, proposed, recommended, required, suggested, urgent, imperative, desirable and the predicate of the subordinate clause is expressed by the simple form of the verb. Sequence of tenses is not important here.</p>
Eg. He ordered that they come	In the object subordinate clause

<p>immediately.</p> <p>Note: In the above mentioned cases the predicate of the subordinate clause may also be expressed by should + infinitive.</p> <p>Eg. It is desirable that he should come today.</p> <p>He ordered that they should come immediately.</p>	<p>beginning with that. Here the predicate of the main clause is expressed by such verbs as advise, ask, command, decree, demand, insist, move, order, agree, prefer, propose, recommend, request, require, stipulate, suggest, urge, decide expressing order, offer, decision and arrangement and the predicate of the subordinate clause is expressed by the simple form of the verb.</p>
<p>Eg. I hurried up lest I be late for the lesson.</p>	<p>In the purpose subordinate clause beginning with lest. Here the predicate of the subordinate clause is expressed by the simple form of the verb.</p>

VOCABULARY

A		
Abrasive	наждачный	najdakli, jilvirli
Acne	угревая сыпь	husnbuzar
actual drilling	текущее бурение	joriy burg‘ulash
Additive	примесь	aralashma
Admixture	примесь	aralashma
Alkylation	алкилирование	alkillashtirish
Alloy	сплав	qotishma
Alteration	изменение	O‘zgarish
Anesthetics	анестетики	anestetiklar
Anticlinal	антиклинальный	antiklinal'
asphalt concrete	асфальтобетон	asfal'tobeton, asfal'tli beton (bog‘lovchi material sifatida bitum ishlatilgan beton)
assortment	ассортимент	assortiment, navlar
atmospheric pressure	атмосферное давление	atmosfera bosimi
B		
auger bit	земляной бур	yer burg‘isi
bailer	желонка	jelonka
bath oil	масло для ванны	vanna uchun yog‘
bull wheel	Инструментальный барабан (установки канатного)	asbobli baraban (kanatli burg‘ulash qurilmasi)

	бурения)	
bauxite	боксит	boksit (alyuminiy rudasi)
Bit blade	лопастное долото	parrakli iskana
bitumen	битум	bitum
block hook	агрегатный крюк	qurilmali ilgak
boiler	котел	qozon
boiling point	точка кипения	qaynash nuqtasi
boring head	бурильная головка	burg‘ulash nuqtasi
boring process	процесс бурения	burg‘ulash jarayoni
brine	рассол, кромка льда	muz qirrasi
<u>bulk transport</u>	перевозка массовых грузов	og‘ir yuklarni tashish
<u>bulkhead</u>	переборка, навес, перегородка	ayvon,
<u>buthane</u>	бутан	butan
C		
<u>cable-tool drilling rig</u>	буровая установка	burg‘ulash qurilmasi
<u>cable-tool method</u>	кабельно-инструментальный метод	kabel'-asbobli metod
<u>candle</u>	свеча	sham
<u>canned products</u>	консервы	konservalar
<u>capacity</u>	вместимость	sig‘im
<u>capture</u>	захватывать	o‘z ichiga olmoq

<u>carbon dioxide</u>	углекислый газ	karbonat angidrid
<u>carbon residue</u>	углеродный остаток	karbonatli qoldiq
<u>carbon</u>	углерод	karbon
<u>cargo</u>	груз	yuk
<u>catalytical cracking</u>	каталитический крекинг	katalitik kreking
<u>catalytical process</u>	каталитический процесс	katalitik jarayon
<u>catalytical reforming</u>	каталитический риформинг	katalitik shakllanish
<u>charcoal</u>	древесный уголь	yog‘ochli ko‘mir
<u>chemical</u>	химический	kimyoviy
<u>chemical processing</u>	химическая обработка	kimyoviy ishlov berish
<u>chemical reactions</u>	химические реакции	kimyoviy reaksiyalar
<u>chlorofloro carbons</u>	хлорфлороуглероды	xloroflorokarbonatlar
<u>cleaning products</u>	чистящие средства	tozalovchi mahsulotlar
<u>coker</u>	коксователь	kokslovchi
<u>coking</u>	коксование	kokslash
<u>collision</u>	столкновение	to‘qnashuv
<u>colorless</u>	бесцветный	rangsiz
<u>column boring</u>	колонное бурение	kolonnali burg‘ulash
<u>combination substances</u>	комбинированные вещества	birlashtirilgan moddalar

<u>comedogenic</u>	комедогенный	komedogen
<u>commodity</u>	товар	baxsulot
<u>component</u>	составная часть	tashkiliy qism
<u>compound gases</u>	составные газы	murakkab gazlar
<u>condensate</u>	конденсат	kondensat
<u>consumable</u>	расходный материал	sarflanadigan material
<u>contaminate</u>	загрязнять	ifloslantirmoq
<u>control room</u>	пункт управления	nazorat xonasi
<u>controversy</u>	полемика	tortishuv
<u>counterpart</u>	слепок, дубликат, двойник	dublikat, nusxa
<u>cracking</u>	крекинг	kreking
<u>crank</u>	кривошип	tirsak
<u>crayon</u>	цветной карандаш	rangli qalam
<u>cream</u>	крем	krem
<u>crop</u>	обрезать	kesmoq, qirqmoq, uzmoq
<u>crown block</u>	кронблок	kronblok
<u>crude oil</u>	сырая нефть	tozalanmagan neft
D		
<u>deicer</u>	Противогололедный материал,	muzlashga qarshi material
<u>deposit</u>	депозит	kon
<u>derrick</u>	вышка	minora

<u>diamond</u>	алмаз	olmos
<u>diesel fuel</u>	дизельное топливо	dizel' yoqilg'isi
<u>dip</u>	окупать	cho'ktirmoq
<u>dissolve</u>	растворяться	erimoq
<u>dissolvent</u>	растворитель	erituvchi
<u>distillate</u>	дистиллят	distillyat, distillovchi
<u>distillation tower</u>	дистилляционная башня	distillash minorasi
<u>drill</u>	бурить, сверлить	parmalash, burg'ulash
<u>drill stem</u>	буровая штанга	burg'ulash shtangasi
<u>drilling</u>	бурение	burg'ulash
<u>dynamic influence</u>	динамическое влияние	dinamik ta'sir
<u>electric charge</u>	электрический заряд	elektr quvvati
E		
<u>emission</u>	эмиссия	emissiya
<u>emit</u>	испускают	chiqarish
<u>environment</u>	окружающая среда	atrof-muhit
<u>evaporate</u>	испариться	bug'lanmoq
<u>explode</u>	взорваться	portlamoq
<u>exploration</u>	разведка	qidirish
<u>explorer</u>	разведчик	qidiruvchi (geolog)
<u>extensive</u>	обширный	keng

<u>Extraction oil</u>	добыча нефти	neftni qazib olish
<u>extrapolate</u>	экстраполировать	ekstrapolyasiya qilmoq
F		
<u>factory</u>	фабрика	fabrika
<u>flame</u>	пламя	otash
<u>fluid</u>	жидкость	suyuqlik
<u>food colourings</u>	пищевые красители	oziq-ovqat bo'yog'i
<u>food industry</u>	пищевая промышленность	oziq-ovqat sanoati
<u>food-grade</u>	пищевой	oziq-ovqatli
<u>fore-and-aft</u>	продольный	bo'ylama, uzunasiga, bo'yiga
<u>fossil fuel energy</u>	ископаемое топливо	qazilma yonilg'i
<u>fracking fluid</u>	жидкость для гидроразрыва	bo'shatish suyuqligi
<u>fractional distillation</u>	фракционная перегонка	fraksion haydash
<u>fuel</u>	топливо	yoqilg'i
<u>fuel oil</u>	горючее	yoqilg'i
<u>furfural</u>	фурфурол	furfurol (kimyo hamda neft' sanoatida ishlatiladigan organik birikma)
<u>furnace</u>	печь	pech'
G		
<u>gallons of gasoline</u>	галлоны бензина	benzin gallonlari
<u>gambling game</u>	азартная игра	qimor o'yini

<u>gasoline</u>	бензин	benzin
<u>geologist</u>	геолог	geolog
<u>geophysicist</u>	геофизик	geofizik
<u>graphite</u>	графит	grafit
<u>greenhouses</u>	теплицы	issiqxona
<u>grief stem</u>	рабочая штанга	ishchi shtanga
H		
<u>heating oil</u>	печное топливо	pechka yonilg'isi
<u>hoist</u>	подъемная машина	ko'tarish mashina
<u>hydro cleaning</u>	гидроочистка	suvli tozalash
<u>hydrocracking</u>	гидрокрекинг	suvli kreking
<u>hydrofluoric acid</u>	плавиковая кислота	shishani o'yish (eyish) qobiliyatiga ega bo'lgan,
		ta'sir kuchi o'tkir kislota;
<u>hydrogen</u>	водород	vodorod
<u>hydrogen sulfide</u>	сероводород	vodorod sul'fidi
<u>hydrosilicate</u>	гидросиликат	gidrosilikat
I		
<u>imbed</u>	укреплять, внедренный	mustxkamlash, joriy qilingan
<u>impregnating substances</u>	пропиточные вещества	singdiruvchi moddalar
<u>intermittent</u>	прерывистый	uzilib-uzilib (to'xtab-to'xtab) sodir bo'ladigan
<u>irrigation ditches</u>	оросительные каналы	sug'orish arig'i

J		
<u>jet fuel</u>	реактивное топливо	reaktiv yonilg'i
K		
<u>kelly</u>	ведущая бурительная труба	birlamchi burg'ulash quvuri
L		
<u>ladder</u>	лестница	zina
<u>lamp oil</u>	ламповое масло	chiroq moyi
<u>lantern</u>	фонарь	yoritgich
<u>layer</u>	слой	qatlam
<u>lifting equipment</u>	грузоподъемное оборудование	yuk ko'tarish uskunasi
<u>limestone</u>	известняк	ohaktosh
<u>lined pipes</u>	футерованные трубы	futerlangan quvur
<u>liquid</u>	жидкость	suyuqlik
<u>livestock</u>	домашний скот	uy hayvoni
<u>locomotive</u>	паровоз	parovoz
<u>lotion</u>	лосьон	los'on
<u>lubricate</u>	смазывать	moylamoq
<u>lubricating oil</u>	смазочное масло	moylash yog'i
M		
<u>magnetic property</u>	магнитное	magnitlik xususiyati

	свойство	
manifold	патрубок, система труб	patrubka, quvur tizimi
maze of pipes	лабиринт труб	chalkash-chulkash kuvurlar
<u>marine loading</u>	морская загрузка	dengizda yuklash
<u>mineral oil</u>	неочищенная нефть	tozalanmagan neft
<u>montan wax</u>	МОНТАНСКИЙ ВОСК	montan mumi
<u>motor fuel</u>	моторное топливо	motor yoqilg'isi
<u>myriad</u>	мириады	son-sanoqsiz, behisob, juda ko'p
N		
<u>natural gases</u>	природные газы	tabiiy gazlar
O		
<u>occlusive solvent</u>	окклюзионный растворитель	okklyuziv erituvchi
<u>octane</u>	октан	oktan
<u>odorless</u>	без запаха	hidsiz
<u>oil boom</u>	нефтяной бум	neft sanoatining keskin rivojlanishi
<u>oil pipeline</u>	нефтепровод	neft quvuri
<u>oil pool</u>	нефтяной бассейн	neft ombori
<u>oil product</u>	нефтепродукт	neft' maxsuloti
<u>oil tanker</u>	Нефтяной танкер	neft' tankeri
<u>oiled fraction</u>	нефтесодержащая фракция	neftli fraksiya
<u>ointment</u>	мазь	malham dori

<u>olestra</u>	олестра	olestra - sintetik yog‘ o‘rnini bosuvchi
<u>outcropping of rock</u>	выход скалы	tog‘ jinsidan otilib chiqish
P		
<u>paraffin</u>	парафин	parafin
<u>petrochemical industry</u>	нефтехимическая промышленность	neft-kimyo sanoati
<u>petrochemical</u>	нефтехимия	neftkimyo
<u>petroleum</u>	нефть	neft
<u>pile</u>	забивать сваи	qoziq qoqish
<u>pinblade bit</u>	лопастное долото	parrakli burg‘i
<u>piping</u>	трубопровод	quvur
<u>pitch</u>	подача	uzatish
<u>plastic</u>	пластик	plastik
<u>polish</u>	полировать	polirovka qilmoq
<u>polyspast</u>	полиспаст	polispast (yuk ko‘taruvchi mexanizm)
<u>porosity</u>	пористость	g‘ovakli
<u>porous rock</u>	пористая порода	g‘ovakli tog‘-jins
<u>precipitate</u>	осадок	cho‘kindi
<u>precipitation tank</u>	отстойник	tindirgich
<u>production</u>	производство	ishlab chiqarish
<u>propane</u>	пропан	propan
<u>protectant</u>	защитник	himoyalovchi
<u>pump</u>	насос	nasos

<u>pump room</u>	насосное помещение	nasos xonasi
<u>purified</u>	очищенный	tozalangan
R		
<u>railcar</u>	вагон	vagon
<u>rancid</u>	протухший	aynigan
<u>refinement</u>	переработка	qayta ishlash
<u>refinery</u>	перерабатывающ ий завод	qayta ishlash zavodi
<u>renowned</u>	известный	mashhur
<u>residual</u>	остаточный	qoldiqli
<u>resinous substance</u>	смолистое вещество	mumli modda
<u>resource</u>	ресурс	manba
<u>revolve</u>	вращаться	aylanmoq
<u>rig</u>	буровая установка	burg‘ulash uskunasasi
<u>rock</u>	камень	tosh
<u>rock strata</u>	горные породы	tog‘ jinslari
<u>rope</u>	веревка	arqon
<u>rotary table</u>	буровой ротор	burg‘ulash rotori
<u>rotary-drill rig</u>	роторная буровая установка	rotorli burg‘ulash minorasi
S		
<u>sandstone</u>	песчаник	qumtosh
<u>saturated</u>	насыщенный	to‘yingan

<u>scour</u>	очистка	tozalash
<u>sedimentary rock</u>	осадочная горная порода	cho'kindi tog' jinsi
<u>sedimentation</u>	осаждение	cho'kish
<u>seepages of gas</u>	просачивание газа	gaz yoyilishi (to'kilishi)
<u>seismic energy</u>	сейсмическая энергия	seysmik energiya
<u>separation</u>	разделение, сепарация	ajratish, separatsiya
<u>sludge</u>	буровой раствор	burg'ulash eritmasi
<u>soak</u>	всасывать	so'rish
<u>softening</u>	смягчение	yumshatish
<u>solution</u>	раствор	eritma
<u>source rock</u>	маточная порода	maxsuldor qatlam
<u>sournatural gas</u>	кислый природный газ	kislotali tabiiy gaz
<u>spud</u>	Бурить скважину	quduqni burg'ulash
<u>steam</u>	испарять	bug'lanish
<u>sterilizing agents</u>	стерилизующие вещества	sterillash maxsulotlar
<u>stiffness</u>	плотность	zichlik
<u>stratigraphic trap</u>	стратиграфическая ловушка	stratigrafik tuzoq
<u>strut</u>	подпорка, подставка	ushlab turish qurilmasi
<u>subsurface</u>	подповерхностный слой, грунтовый	qobiq qatlami

<u>subsurface reservoir</u>	подземный приёмник	yerosti ombori
<u>sulfur</u>	сера	oltingugurt
<u>sulfuric acid</u>	серная кислота	sul'fat kislotasi
<u>surface geology</u>	поверхностная геология	yuza geologiyasi
<u>suspended</u>	приостановленны й	to'xtatilgan
<u>swivel</u>	вертлюг	vertlyug (turli mexanizmlarda birikkan detallarning bir-biriga nisbatan aylanishini ta'minlovchi zveno)
<u>synthesize</u>	синтезировать	sintez qilish
T		
<u>tar</u>	деготь	qatron
<u>thermal manufacture</u>	термическое производство	termik ishlab chiqarish
<u>thermal process</u>	термический процесс	termik jarayon
<u>to pave</u>	проложить, прокладывать	qurmoq, solmoq, yotqizmoq
<u>toxic chemicals</u>	токсичные химикаты	zaharli ximikatlari
<u>track down</u>	отслеживать	kuzatmoq
<u>transform</u>	преобразовать	qayta qurmoq (tuzmoq), yangidan qurmoq (tuzmoq); tubdan o'zgartirmoq
<u>transportation infrastructure</u>	транспортная инфраструктура	transport infratuzilmasi
<u>transporting</u>	транспортировка	tashish
<u>trap</u>	заслонка	zaslonka, klapan

<u>treatment</u>	Очистка, обработка	tozalash
<u>truck</u>	грузовик	yuk mashinasi
<u>trunkline</u>	магистраль	magistral' (markaziy yul)
<u>turntable</u>	Поворотный круг	aylanish doirasi
U		
<u>undersea mud</u>	подводная грязь	suvosti loy
<u>unification</u>	объединение	birlashtirish
<u>naphtha</u>	нафта	nafta
V		
<u>vaporize</u>	испарять	bug‘lash
<u>vegetable oil</u>	растительное масло	o‘simlik moyi
<u>visbreaking</u>	висбрекинг	visbreaking
<u>viscosity</u>	вязкость	qayishqoqligi
<u>volcano</u>	вулкан	vulqon
W		
<u>walking beam</u>	Балансир бурового станка	burg'ulash moslamasini muvozanatlashtirgichi
<u>Waste water treatment</u>	очистки сточных вод	oqova suvlarni tozalash
<u>wax</u>	воск	mum
<u>weave</u>	ткать	to‘qimoq
<u>weld</u>	сваривать	payvandlash
<u>whale oil</u>	китовый жир	kit moyi

<u>wheels</u>	Колеса, механизм	g'ildirak, mexanizm
Z		
<u>zeolite</u>	цеолит	seolit

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1- dars. Neft nima?

2- dars. Neftning tarixi.

3- dars. Gazlar.

4- dars. Neft va gazning umumiy tavsifi

II – bo’lim. Neft va gazni qidirish va burg’ulash.

1- dars. Neft konini qidirib topish.

2- dars. Quduqlarni burg’ilash.

3- dars. Tabiiy gazni qidirish

4- dars. Tabiiy gazni burg'ulash qanday ishlaydi?

III – bo’lim. Neft va gaz texnologiyalari va transporti.

1- dars. Burg’ilash minoralari va burg’ilash ustunini tushirish va ko'tarish uskunasi.

2- dars. Burg'ulash iskanalarining vazifalari va tasnifi.

3-dars. Neft va gazni tashish usullari

4-dars. Neft kemalari (tankerlari).

IV– bo’lim. Neft va gazni qayta ishlash.

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2- dars. Neft va gazni qayta ishlashga tayyorlash.

3-dars. Neft va gazni qayta ishlashning asosiy yo'nalishlari.

4-dars. Kimyoviy ishlov berish.

V– bo’lim. Neft va gaz mahsulotlari.

1- dars. Mum, kerosin va bitum.

2- dars. Neftning oziq-ovqat sanoatida ishlatilishi.

3-dars. Neft va gaz yoqilg'ilari

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