МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
Красноармійський індустріальний інститут
Державного вищого навчального закладу
«Донецький національний технічний університет»

Матеріали для самостійної роботи з англійської мови

(вправи та тексти)

для студентів 1 курсу напрямку підготовки «Гірництво»

2010 рік

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Розглянуто
на засіданні кафедри СГП
протокол № __ від _____
Затверджено
на засіданні навчально–видавничої ради ДонНТУ
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2010 рік

Матеріали для самостійної роботи (для студентів 1 курсу денного відділення спеціальностей РКК та ОПГ). Самофалова Т.В. – КІІ ДВНЗ ДонНТУ.

Містить вправи з граматики англійської мови, що обіймають граматичний матеріал та лексику, передбачені програмою для 1 курсу напрямку підготовки «Гірництво».

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Contents:

Nouns

In most cases the Plural of the Nouns is formed by adding the ending « -s ».

Ex. a house – houses

But there are some exceptions. These are (a) Latin and Greek borrowings, (b) some original English nouns and (c) nouns without exact graphical forms of the Plural.

a. "-us" – "-l" ex. radius – radii
   "-um" – "-a" ex. datum – data
   "-a" – "-ae" ex. formula – formulae
   "-on" – "-a" ex. criterion – criteria
   "-is" – "-es" ex. basis – bases
b. a man – men, a woman – women, a child – children, a foot – feet, a tooth – teeth, a goose – geese, an ox – oxen, a mouse – mice, a louse – lice.
c. a means – means, a series – series, a species – species.

Some nouns have not the Plural.

Ex. Information, news, money, advice, progress etc.

Task 1. Continue the sentences, paying attention at the Plural of the nouns.

a)I saw two strange there (a man).
b)These (a means) are often used in mining.
c)There are a plenty of (a nebula) in the Universe.
d)The length of diameter is the sum of two (a radius).

Task 2. Find the mistakes.

a)a new – news; b)a nebula – nebulae; c)a book – books; d)a species – species; e)a mean – means; f)a radius – radii; g)an information – informations; i)a datum – data; j)a goose – gooses; k)a man – men; l)a basis – basses.

Task 3. Continue the sentences, paying attention at the Plural of the nouns.

a)He saw two strange (a woman) there.
b)These are very popular (a means) in mining engineering.
c)There are a plenty of (a formula) in chemistry.
d)Physics knows three (a species) of the matter.
e)The sum of two (a radius) makes a diameter.

Task 4. Find the mistakes.

a)a radius – radiuses; b)a nebula – nebulae; c)a new – news;

d)a mean – means; e)an advice – advices; f)a datum – data;
g)a tooth – teeth; h)a mouse – mouses; i)a basis – bases;
j)an axis – axises; k)a man – men; l)a stratum – stratus.

Task 5. Divide these nouns into groups according to the way of formation of the Plural.

A man, a book, an uncle, a foot, a woman, a phenomenon, a child, a mine, a tooth, an ox, a radius, a mirror, a means, a stratum, an axis, a basis, a house, a focus, a criterion, a formula.

Task 6. In cash line choose one word that doesn't belong to the group.

a)a stimulus, a species, a datum, a nucleus, a radius;
b)advice, news, information, progress, means, knowledge;
c)a phases, a stratum, an analysis, a formula, a series.

Task 7. Divide the following nouns into groups according to the way of forming.

A family, a man, a stimulus, a codex, a vivarium, a line, a child, a girl, a street, a species, a miner, a goose, a foot, a radius, a circle, a formula, a maximum, a series, an analysis, a vertex, a means, a root, an institute, a datum, a stratum, a mouse, a cube.

Task 8. Exclude one word that doesn't belong to the line.

a) A mouse, a radius, a series, a datum, a man, a child;
b) an ox, a house, an institute, a day, a year, a century;
c) a computer, a line, a species, a means, a focus;
d) a car, a woman, a series, a foot, an axis, a phenomenon;
e) information, news, means, advice, progress, money;
f) radii, loci, data, men, women, strata, news;
g) maxim, minim, criteria, nebula, strata;
h) formulate, crises, bases, criteria, means, axes;
i) formula, amphora, nebula, criteria, vertex;
j) geese, teeth, mice, advice, axes;
k) axes, phases, analyses, species, bases;
l) a radius, a focus, an equilibrium, an axis, a foot, a vortex, a box;
m) vertexes, bases, minim, stimuli, a man;
n) a codex, a vertex, a datum, a vortex;
o) series, means, crises, species, vertexes, phases;
p) news, advice, crisis, species, money;
q) a stratum, a criterion, a stimulus, a phenomenon;
r) an axis, a basis, a nebula, a phases;
s) information, formulate, loci, stimuli, strata, phases;
t) a species, a criterion, a room, a formula, a mouse;

u) teeth, geese, criteria, rains, means, nebulae, species.

Task 9. Fill in the gaps.

1. The sum of two radii (…..) make a diameter.
2. Development of telescope helped to find plenty of nebula (……) unseen with a naked eye.
3. Find a distance between two foc (……).
4. Archimed developed all basic formula (……) people use nowadays.
5. He always gives me very useful advice (……)
6. By what criteria (……) does he estimate your work?
7. There are a lot of phenomena (……) in the world.
8. Carrying out the experiment you have to use the following data (……).
9. Pay attention at minim (……) and maxim (……) of this figure.
10. In the upper strata (……) of atmosphere one cannot breathe.
11. This formula (……) is well known.
12. A strata (……) of hard rock was drilled last week.
13. These phase (……) are of great importance for success of the experiment.
14. Decart system of coordinates has three ax (……).
15. More than 1.500 of code (……) in the Kiev State Library.
16. The vert (……) of triangle is acute.
17. One of these formula (……) contains a mistake.

Numerals

For saying dates Ordinal Numerals are used.

ex. March, 3 – **The third** of March

For saying time and years Cardinal Numerals are used.

ex. 1876 – **eighteen seventy six**

but 2000 – 2099 **two thousand – two thousand ninety nine**

1800 – **eighteen hundred**

8.20 – twenty **past** eight

9.55 – five **to** ten

12.30 – **half** past twelve

In Common fractions both Cardinal and Ordinal Numerals are in use.

ex. 2/3 – **two** (Cardinal) **thirds** (Ordinal)

In Decimal fractions each numeral is read.

ex. 0,596 – naught point five nine six.

Task 1. Write the following dates in English.

a) 12, March 1324;
b) 23, January 2012;
c) 01, May 1897;
d) 21, June 1003;
e) 18, February 1967;
f) 30, April 1354;
g) 06, July 1455;
h) 13, October 1167;
i) 24, October 1675;
j) 27, September 2056.

Task 2. Find mistakes if there are any.

a) One sevens;
b) two fifth;
c) six eights;
d) five sixths;
e) seven eights;
f) three fours;
g) four sixths;
h) ten fifteenths;
i) five sixes;
j) six thirtieths.

Task 3. Write the following frictions.

a) 1/3; 1/4; 1/5; 4/6; 3/7;
b) 1,356; 45,534; 4,006; 20,1006; 12,405.

Task 4. Find mistakes.

a)Tom is Polly's third husband.
b)He came back on a twenty of May.
c)Today is the first of October twenty third (01.10.2003).
d)On the fifth of May he left for New York.
e)Tom was born in the twenty second of September nineteen sixty two.
f)In one thousand nine hundred fifty third I. W. Stalin died.
g)One fifth of all population of the Earth are the Chinese.
h)Two thirds of all diamonds are mined in the South Africa.
i)One third of it's life a human being sleeps.
j)In two thousand one the USA proclaimed a war against terrorism.

Task 5. Write numerals with the units of weight and length.

1. **Units of length** 5'6"; 4'5"; 6'3"; 7'2"; 4'5"; 6'7". (feet and inches)
2. **Units of weight** 26 lb., 100 lb., 234 lb., 365 lb., 298 lb. (pounds)

Comparative and Superlative degrees of Adjectives and Adverbs.

Comparative and Superlative degrees of Adjectives and Adverbs can be formed in two different ways (a) Simple and (b) Complex ones.

By Simple way of forming Comparative degree is formed by adding the endings "**-er**".

By Simple way of forming Superlative degree is formed by adding the ending "**-est**", using the Definite Article "**The**" in the Superlative degree of Adjective is necessary.

Simple way of forming Comparative and Superlative degrees of Adjectives takes place when Adjective has **one syllable** and when it has **two syllables** and endings **"-ly", "-ow", "-y"** and **"-er"**.

ex. cold – cold**er** (Comparative degree) – **the** cold**est** (Superlative degree)

narr**ow** – narr**ow**er – the narr**ow**est.

Task 1. Make the Comparative and Superlative degrees of Adverbs according to the Example.

ex. It rains **heavily**, today, than, yesterday.

It rains **more heavily** today, than it rained yesterday.

a) It is, sunny, today, than, yesterday.
b) It snows, little, than, yesterday.
c) It is, beastly, today, than, two days ago.
d) It is, cool, now, than, last winter.
e) It rains, hardly, today, than, all next autumns.
f) It was, rainy, tomorrow, than, today.
g) It will be, hot, next summer, than, last summer.
h) It rained, beastly, last autumn, than, next autumn.
i) It will snow, much, in January, than, in December.
j) It was, foggy, two days ago, than, yesterday.

Task 2. Make the sentences using the constructions:
"twice as…as", "twice as…", or constructions with the nouns: "twice one's size", "twice one's length", "twice one's depth", "twice one's number" and so on.

ex. This tree is 3 I high. That tree is 6 m high.

That tree is **twice as high as** this one.
That tree is **twice as high.**
That tree is **twice the hight of** this one.

a) This shaft is 200 meter deep. That one is 400 meter deep.
b) This drift is 10 meter long. That one is 20 meter long.
c) The first radius is 20 cm long. That one is 40 cm long.

d) My speech was 50 minutes long. Yours was one hour long.
e) The door is 1 m wide. The window is 2 m wide.
f) I am 30 years old. He is 60 years old.
g) This well is 2 m deep. That one is 4 m deep.
h) There are 5 kg in my sack. There are 10 kg in yours.
i) The first shift cut 3000 tons. The second shift cut 6000 tons.
j) This wall is 20 cm thick. That one is 40 cm thick.

Task 3. Give the Comparative and the Superlative degrees of the following Adjectives.

Beautiful, bad, good, far, near, rainy, sunny, easy, hard. Warm, cold, serious, hot, big, large, small, wide, narrow, tall, kind, mild, snowy, self – confident, active, thick, long, thin, funny, practical, nice, shy, slender, polite, thankful, happy, sad, glorious, tiny, deep, high.

Task 4. Translate the following sentences into English.

1. Це втричі далі від того, що було вказано на мапі.
2. Візьми цю каменюку, вона вдвічі легша.
3. Відстань між найближчими вершинами трикутника вчетверо коротша від суми радіусів кола.

Types of Questions.

Task 1. Ask General, Special and Disjunctive questions to the following sentences.

1. There were 7 wonders of the Ancient World.
2. Only the Pyramids of Egypt remained.
3. The Colossus of Rhodes was ruined with the strong earthquake.
4. Now another wonders exist in the world.
5. Penicillin saved a lot of people.
6. Computer changes our world greatly.
7. Landing on the moon was a giant leap for mankind.
8. Average life expectancy in Europe rose dramatically for last century.
9. The population in Greece sees cruds of tourists treble in summer.
10. They don't agree that holidays is the wonder of the modern world.
11. Jonathan Swift wrote that a careful peasant is better than a politician.
12. Politicians cannot solve the problems of famine.
13. We still exist on this planet.
14. We shall never use nuclear weapon.

Task 2. Translate the following sentences into English.

General question **Do (does, did) + Subject + Verb** or **Modal Verb + Subject + (Verb)**

Special question a) **What (where, when, whom etc) + Structure of General question**

b) **Who (what) + the rest of the sentence**

Disjunctive question **Negative sentence + do (does, did, modal verb) n|p + Pronoun**

1. Ми назвали «Метричною» систему, за її основною одиницею виміру – метру, чи не так?
2. Більшість країн прийняло «Метричну систему»?
3. Що було стандартом довжини у стародавньому світі?
4. В англо – мовному світі користуються традиційною системою виміру?
5. Як англійці визначали ярд?
6. Кілограм – це циліндр платино – іридієвого сплаву, чи не так?
7. Де метр має своє походження?
8. Коли востаннє вчені перевизначили метр?
9. Кілограм – це 1 кубічний дециметр чистої води за температури її максимальної щільності, чи не так?
10. Основна одиниця виміру часу – хвилина, чи не так?
11. Обертання Землі навколо своєї осі слугує основою стандартом часу?
12. Відстань між точкою замерзання води та точкою кипіння, на своїй шкалі Цельсій поділив на 100 градусів?

Task 3. Ask four types of questions to the following sentences.

a) You are so busy today.
b) There is something wrong with your watch.
c) He was fond of music.
d) Tom couldn't meet Polly at 5 o'clock.
e) Polly wants to see Ann on Monday.
f) Tom got arrived to Polly last month.
g) Ann will answer all your questions.
h) Tom and Tom's father-in-law were not good at fishing.

Task 4. Ask special questions to all parts of sentences but not to the Subject.

ex. We made friends with Ann two year ago.

When did we make friends with Ann?

a) I shall meet you in three days.
b) Tom is fond of the expensive cars.

c) Ann's aunts were going to buy a new house.
d) Mike's brother-in-law invited him to take part in a new program.
e) Tom wants to have nothing in common with you.
f) It is raining now.
g) Tom saw her either on Monday or on Tuesday.
h) Tom could say nothing to Ann.
i) Tom is an old friend of hers.

Task 5. Complete the Disjunctive questions.

ex. Tom couldn't say anything, … he?

Tom couldn't say anything, could he?

a) Ann was fond of drawing, … she?
b) Mike … good at chemistry, isn't he?
c) Tom and Polly want to get arrived, … they?
d) Mike and Ann … going to get married, weren't … ?
e) He said this to Tom, … he?
f) You made friends some years ago, … you?
g) Tom must marry Ann, … he?
h) Ann and Mike … friends in London, didn't … ?
e) Tom has no news, … he?
i) You had something to say to Tom, … you?
j) Polly hadn't difficulties with exams, … he?

Passive Voice

To be + Past Participle

1. Past Indefinite; **ex.** A lot of discoveries about the nature of electricity **were made.**

2. Present Indefinite; **ex.** A glass rod **is rubbed** with a silken cloth.

3. Future Indefinite; **ex.** Light objects **will be attracted** with a piece of electrified amber.

Task 1. Remake the following sentences changing Active Voice to Passive Voice.

1. The ancient Greeks knew the properties of amber.
2. A lot of scientists investigated the electric phenomena.
3. During the nineteenth century scientists made many discoveries about the nature of electricity.

4. Scientists found a plenty of new facts.
5. When we bring electrified rod near one another, then an electric spark passes between them.
6. Scientists called two kinds of electricity “resinous electricity”.
7. An electrified glass rod repels a similar rod.
8. In the eighteenth century scientists studied electric phenomena.
9. Scientists developed ideas of attracting of opposite kinds of electricity.

Task 2. Change Past Indefinite and Present Indefinite to Future Indefinite.

ex. A lot of discoveries about electricity **were made.**

A lot of discoveries about electricity **will be made.**

Task 3. Ask General, Special and Disjunctive questions to the remade sentences from the task 1. To finish, to open up, to start, to sink, to drive, to reach, to proceed, to explore, to justify in, to establish, to break, to mine, to transport, to divide into, to strike.

Task 4. Form Passive Voice Infinitive of the verbs given above.

Task 5. Translate into English.

a) Ми поділимо родовище на зручні блокию
b) Ми починаємо підготовку шахти різноманітними розробками.
c) У багатьох випадках ми ведемо вертикальний ствол.
d) У гірських районах ми ведемо горизонтальну виробку до родовища.
e) Розвідка переконала нас у тому, що вугілля нашого родовища варте щоб його видобувати.
f) Ми легко транспортуємо відбите вугілля на поверхню.
g) Підготування шахти залежить від форми родовища.
h) Ми насамперед розвідуємо родовище у горизонтальному та вертикальному напрямках.
i) Ми дістались до вугілля на цій глибині.
j) Ми почнемо видобувати нафту у цьому регіоні за три роки.

Task 6. Choose necessary form of the verb.

1. A metallic solid … with tiny crystals (are made up, is made up).
2. The structure of atom … with scientists (were explained, are explained).
3. The electrons … to move through the metal conductor (is caused, are caused).
4. The motion of electrons … with an e. m. f. (is produced, were produced).
5. An electric current … with the movement of free electrons (is induced, are induced).
6. An electric current … never … (was … seen, were … seen).
7. Electric currents … by its effects (is known of, are known of).

8. A conductor … with an electric current (were heated, was heated).
9. A magnetic effect … with an electric current (is produced, are produced0.
10. An electric current … by people (is measured, were measured).
11. Scientists … chemical and magnetic effects of currents (observed, were observed).
12. Three kinds of currents … by people (know, are known).
13. Some ways of solution of famine problem … by politicians (were found, found).
14. The properties of amber … by ancient Greeks (investigated, were investigated).
15. We … electricity everywhere (are used, use).
16. Many discoveries about the magnetism … by scientists (were made, made).
17. In the eighteenth century an e. m. f. … by scientists (don't know, wasn't known).
18. An electric spark passes when we … wax rod and glass rod near one another (bring, are brought).
19. The power of attracting light objects … with amber (achieves, is achieved).

Task 7. Remake the sentences using Passive Voice.

1. Our factory will not dress ore.
2. We shall not mine many sorts of coal.
3. People don't use economical minerals in all branches of industry.
4. They didn't mine numerous kinds of coal in this region.
5. The miners didn't brake out and transport to the surface coal.
6. The explorers didn't find a new ore deposit.
7. The explorers prospected the locality and thickness of the deposit.
8. In the Southern Africa they mine diamonds.
9. They called preliminary work Prospecting.
10. We started mining enterprise.
11.The miners mine raw materials for chemical industry.
12. The miners drove a tunnel to a deposit.
13. They measured the thickness of the bed.
14. They didn't transport the ore to the plant.
15. In the Ancient ages miners used oil-lamps.
16. The explorers will drive two drifts next month.
17. We search for new coal deposits.
18. We didn't ascertain the real extent of deposit.
19. By word "mining" we mean the underground work.
20. They didn't equip their enterprise.
21. We transported all necessary raw materials to a factory.
22. We use minerals as raw materials in various branches of industry.
23. We didn't investigate the locality of the deposit.
24. They ascertained the shape of this deposit.

Task 8. Remake the sentences according to the example.

ex. This factory dresses all kinds of economic minerals.

All kinds of economic minerals are dressed with this factory.

a) We produce metals from the ore.
b) People use metals in machine building.
c) They mine numerous kinds of coal in this region.
d) The miner breaks out and transports to the surface the economic mineral.
e) The explorer determines whether miners can begin mining enterprise.
f) First of all the explorers prospect the locality of the mineral.
g) In Great Britain they equip mines with the modern machines.
h) They call preliminary work Prospecting or Exploration.
i) We can start underground exploration when we finish the preliminary prospecting work.
j) The miners sink shafts and drive so-called Crosscuts when they open mining enterprise up.
k) In mountainous areas miners simply drive a tunnel to a deposit.
l) The developments workings divide the deposit into suitable blocks.
m) Miners can easily transport the ore.
n) They support the mine workings in order to prevent the caving of the roof.
o) Supporting keeps the filing in certain position.
p) Supporting protects the mine workings against flooding.
q) Supporting prevents the rocks from increasing in volume.
r) They carry out supporting for a variety of reasons.
s) In poor countries mines miners broke the ore with hammer picks.
t) The explorers drive two levels this week.

Task 9. Ask General, Special and Disjunctive questions to each remade sentence.

ex. All kinds of economic minerals are dressed with this factory.

Are all kinds of economic minerals dressed with this factory?

What is dressed with this factory?

All kinds of economic minerals are dressed with this factory, aren't they?

Task 10. Write the remade sentences using Future Indefinite and Past Indefinite instead of Present Indefinite.

Ex. All kinds of economic minerals are dressed with this factory.

All kinds of economic minerals will be dressed with this factory.

All kinds of economic minerals were dressed with this factory.

Task 11. Ask General, Special and Disjunctive questions to the sentences remade according to the task 3.

Ex. All kinds of economic minerals are dressed with this factory.

Are all kinds of economic minerals dressed with this factory?

What kinds of economic minerals will be dressed with this factory?

All kinds of economic minerals were dressed with this factory, weren't they?

Task 12. Remake the sentences according to the example.

1. This factory dresses all kinds of economic minerals.
2. We produce metals from the ore.
3. People use metals in machine building.
4. They mine numerous kinds of coal in this region.
5. The miner breaks out and transports to the surface the economic mineral.
6. The explorer determines whether miners can begin mining enterprise.
7. First of all the explorers prospect the locality of the mineral.
8. In Great Britain they equip mines with the modern machines.
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10. We can start underground exploration when we finish the preliminary prospecting work.
11. The miners sink shafts and drive so-called Crosscuts when they open mining enterprise up.
12. In mountains areas miners simply drive a tunnel to a deposit.
13. The developments workings divide the deposit into suitable blocks.
14. Miners can easily transport the ore.
15. In poor countries mines miners broke the ore with hammer picks.
16. The explorers drove drove two levels this week.
17. They search for new sources of energy.
18. We ascertained the richness of deposit.
19. Under term "prospecting" we often mean the search for minerals.
20. They equipped their enterprise very well.
21. We transported all necessary equipment to a factory.
22. Minerals give raw materials for various branches of industry.
23. We investigated the locality of the deposit.
24. They will ascertain a real extent of this deposit.

Task 13. Remake the sentences using Passive Voice.

1) Tiny crystals make up a metal.
2) They explained the structure of atoms.

3) Some driving force cause the electrons to move through the metal conductor.
4) An e. m. f. produce the motion of electrons.
5) The movement of free electrons induces an electric current.
6) Nobody saw an electric current.
7) We know of an electric current by its effects.
8) A current heats a conductor.
9) An electric current produced a magnetic effect.
10) We measured currents.
11) Scientists observed chemical and magnetic effects of currents.
12) People know three kinds of currents.
13) Politicians found some ways of solution.
14) People investigate the properties of currents.
15) We use electricity in every day life.
16) People made many discoveries about the properties of electricity.
17) In the eighteens century scientists didn't measure currents yet.
18) An electric spark passes when we bring wax rod and glass rod near one another.
19) Electrified amber achieves the power of attracting light objects.

Modal verbs

Task 1. Use the verb "to be allowed" instead of the modal verb "may" where it is possible.

Ex. You **may** take this book.

You **are allowed** to take this book.

a) You may stay and listen to Tom's speech.
b) He wants to come to the party but he may not leave home.
c) Tome may have come home.
d) He might be waiting for your answer.
e) It may rain tomorrow.
f) Mike said, that you might go home.
g) He said that might be true.
h) There may be just a little wine in the bottle.
i) No one may enter this room!
j) One may touch nothing!

Task 2. Use the necessary forms of the modal verb "can" or the verb with the same meaning "to be able to", paying attention to the time markers.

Ex. Tom ….. return **in three days.**

Tom **will be able** to return in three days.

a) Ann ….. come to Mike **two days ago.**
b) Tom ….. do this exercise **tomorrow.**
c) Polly said that she would ….. answer our question **in a while.**
d) We ….. win **yesterday,** we ….. win **tomorrow.**
e) Can it be true? He ….. cross the Atlantic **last year** and he says he ….. cross the Pacific ocean!

Task 3. Translate into English, using Passive Voice.

a) Вугілля може видобуватись на цій глибині.
b) Багато мінералів може використовуватись у різноманітних галузях виробництва.
c) Родовище має бути ретельно досліджено.
d) Руду не можна легко транспортувати по цій виробці.
e) Зараз руду не можна рубати через присутність копального газу. Під терміном «розвідка» може розумітись пошук мінералів.
g) Видобуте вугілля має бути збагачено.
h) Шахту можна підготувати прокладанням стволів та веденням штреків від них.
i) Підготовчі виробки мають бути розташовані у такий спосіб, щоб родовище можна було зручно розробляти, а вугілля легко транспортувати.
j) Розвідні штреки мають вестись так, щоб їх можна було використовувати для розробки.

Action in Future

Future actions can be conveyed with the help of the following Tenses:

1. Future Indefinite; Shall (will) + Infinitive

Ex. The mine will start working next year.

2. Future Perfect; Shall (will) + Perfect Infinitive

Ex. The mine will have started working at 5 o'clock.

3. Present Indefinite;

Ex. In two weeks we change the supporting of this drift.

4. Present Continuous;

Ex. The explorers are prospecting this deposit next year.

5. To be going to;

Ex. The mine is going to increase volume of the mining.

Task 1. Translate from Ukrainian into English.

a) Ми збираємось збільшити кількість вугілля, що видобувається.
b) У цьому штреку для кріплення, буде використано бетон.
c) Англійці розроблятимуть нафтові родовища на півночі Іраку.
d) Колись Україна видобуватиме природний газ з родовищ Зміїного острова.
e) Це кріплення буде достатнім у таких умовах.
f) Нова система провітрювання постачатиме у півтора рази більше повітря, якого буде достатньо для дихання у забоях.
g) За рік кількість вугілля, що видобувається, збільшиться втричі.
h) Розвідувальні виробки поділять родовище на блоки, зручні для розробки.
i) За півроку це підприємство видобуватиме, збагачуватиме та постачатиме втричі більше руди.
j) До кінця цього року підприємство виробить 1500000 тон вугілля.

Task 2. Ask General, Special and Disjunctive questions to the translated sentences from the task 1.

Ex. This enterprise will increase the mining of coal next year.

Will this enterprise increase the mining of coal next year?

When will this enterprise increase the mining of coal?

This enterprise will increase the mining of coal next year, won't it?

Task 3. Remake the sentences from the task 1 using Passive Voice.

Ex. This enterprise will increase the mining of coal next year.

The mining of coal will be increased with this enterprise next year.

Task 4. Translate into English, paying attention at Future Tense of Modal Verbs.

1. Ми повинні закріпити навіть ті штреки, які потребуватимуть тільки тиждень або два.
2. Вони зможуть збільшити видобуток у наступному році.

3. Шахта занадто глибока, тому вентиляційні стволи незабаром, не зможуть постачати достатньо повітря для дихання.
4. Бетон та стальні стояки зможуть витримати такий тиск.
5. Люди повинні шукати та використовувати нові джерела енергії.
6. З таким обладнанням люди зможуть розробляти родовища навіть на дні океану.
7. Вам можна буде почати роботупісля легазації.
8. Ви зможете використовувати ці лампи у виробках, що заповнені метаном.

Perfect Tenses

1. Present Perfect Tense. Ex. We **have driven** a drift this week.

Time markers – today, this week (month, year), already, recently, lately, up to now.

2. Past Perfect Tense. Ex. We **had driven** this drift already when necessary equipment came.

Prepositions – when, by.

3. Future Perfect Tense. Ex. We **shall have finished** driving this drift by the end of June.

Prepositions – by, till. Ex. by 5 o'clock (the first of June, the end of this week).

Task 1. Translate the following sentences into English, using Perfect Tense.

1. Наше підприємство нещодавно збагатило 100,000 тон руди.
2. До двадцять восьмого травня наше гірниче підприємство видобуде 1,500,000 тон вугілля.
3. До кінця цього тижня ми проведемо штрек.
4. Вони встановили природу родовища, його справжній запас та прибутковість підприємства.
5. Ми розробили це родовище, коли вони знайшли більш прибуткове.
6. Ми закінчили підготовчі роботи у цьому місяці.
7. Ми проклали 29 кілометрів штреків відтоді, як почали розробляти це родовище.
8. До третього вересня ми досягнемо вугілля.
9. Ми ще не видобули 1,000,000 тон руди.
10. Це підприємство не збагачувало вугілля з минулого року.

Task 2. Choose the necessary time marker from the brackets.

1. Our factory will not have dressed all ore … the end of this year (by, till, since).
2. People have been mining many sorts of coal … 200 years (by, till, for).
3. We have been using economical minerals in all branches of industry … the beginning of the eighteenth century (by, since, till).
4. They had mined all coal … the beginning of industrial development (till, by. since).
5. The miners have broken out the ore and transported it to the surface … (already, by the evening).
6. The explorers hadn't found a new coal deposit … (this year, before an old one was mined).
7. The explorers will have prospected the locality and thickness of the deposit … next month (since, by).
8. In the Southern Africa they have been mining diamonds … 40 years (by, for, since).
9. They will not have finished preliminary prospecting work … the 1st of May (since, by).
10. We have started mining enterprise … (recently, 2 years ago).
11. People have been mining raw materials for chemical industry in this region … 2 centuries (by, since, for).
12. The miners have driven a tunnel to a deposit … (this week, 2 days ago, by the end of the last month).
13. They will have measured the thickness of the bed … the 23rd of September (since, for, by).
14. They had transported the ore to the plant … (today, by the 3rd of October).
15. … the Ancient ages people have been mining copper in these mountains (for, since, by).
16. The explorers will have driven two drifts … next month (by, since, for).
17. We have been searching for new coal deposits … 2003 (for, by, since).
18. We have ascertained the real extent of deposit … (by the end of this year, this year, for 2 years).
19. Our factory had dressed 1,000,000 tons of coal … (today, this year, by the end of 2000).
20. They have equipped their enterprise … (for 6 months, lately, by tomorrow).
21. We had transported all necessary raw materials to a factory … (by last Monday, by next week, for 3 months).
22. We have been using minerals as raw materials in various branches of industry … old times (by, for, since).
23. We shall have investigated the locality of the deposit … (in 5 months, by next year, for 7 months).
24. They have ascertained the shape of this deposit … (recently, 3 weeks ago, on last Monday).

Task 3. Choose the necessary Perfect Form of the given verb, paying attention at the time markers.

1) The explorers ….. a new coal deposit lately (to find).
2) The explorers ….. the thickness of this ore deposit this year (to prospect).
3) In country they ….. gold since 1860 (to mine).
4) They ….. preliminary prospecting work by the end of last year (to finish).
5) We ….. mining enterprise already (to start).
6) Their plant ….. all ore by the end of the next year (to dress).
7) We ….. many sorts of coal in our region for 50 years.
8) We ….. economical minerals for all branches of industry since the end of the eighteenth century (to mine).
9) They ….. all coal, when they found gas deposit (to mine).
10) The factory ….. 1,500 tons of ore today (to dress).
11) We ….. the real extent of deposit for 2 years (to ascertain).
12) Our factory ….. 1,000,000 tons of coal by the
13) They ….. their enterprise for 6 months (to equip).
14) We ….. all necessary raw materials to a factory by next week (to transport).
15) We ….. the locality of the deposit for 7 months (to investigate).
16) The miners ….. a tunnel to a deposit by the end of this month (to drive).

Task 4. Ask General, Special and Disjunctive questions.

1. We have been using this old deposit since the end of the last century.
2. They will have sunk a new shaft by the next month.
3. We had transported all economical minerals by the end of the year.
4. They have struck a coal this week.
5. The explorers will have reached a deposit by December.
6. They have made a deposit accessible up to now.
7. We have started mining enterprise lately.
8. People have been mining raw materials for chemical industry in this region for 2 centuries.
9. The miners have driven a tunnel to a deposit this month.
10. They have been measuring the thickness of the bed for two months.
11. Our plant will have dressed all raw materials by the next year.
12. People have been using coal since 13^{th} century.
13. We have been dressing economical minerals for all branches of industry for 50 years.
14. They have transported all coal.
15. The miners have broken out 5000 tons of ore this week.
16. A factory had dressed 1000 tons of coal more by the end of the last week.
17. The explorers have driven 300 meters of openings.
18. The explorers will have measured the richness of the deposit by the next month.
19. They have finished preliminary prospecting work.
20. Our mining company will have opened up another coal deposit by the end of this year.

Sequence of Tenses

Present Indefinite – Past indefinite

The volume of mining **is** sufficient.

Ex. He said, that the volume of mining **was** sufficient.

Present Perfect, Past Indefinite and Past Perfect – Past Perfect

The volume of mining **increased** very much.

Ex. He said, that the volume of mining **had increased** very much.

Shall – should, will – would.

The volume of mining **will** be increased.

Ex. He said, that the volume of mining **would** be increased.

Task 1. Translate the following sentences.

1) Виробка залишиться незакріпленою.
2) За три місяці запрацює новий вентиляційний ствол.
3) Постачання повітря у шахтні виробки, є однією з важливіших задач.
4) Розвиток індустрії потребує збільшення видобутку вугілля.
5) Збільшення глибини потребуватиме штучної вентиляції, бо природна течія повітря вже не буде достатньою.
6) Наше підприємство вже видобуло 1000000 тон руди, завдяки чому, видобуток збільшиться вдвічі.
7) Окислювання вугілля спричиняє розвиток тепла у пластах.
8) Нове обладнання зменьшить загрозу спонтанного загорання вугілля.
9) Минулого року англійці проклали новий ствол.
10) Сьогодні наша зміна почала вести штрек.

Task 2. Transfer the translated sentences from the task 1 into the Indirect Speech, starting each phrase with the words: "He said, that …..", "He reported, that …..", "It was said, that …", "We've got to know, that ….."

Task 3. Transfer the following questions into Indirect Speech.

1. He asked us: "Did you start sinking a new ventilating shaft?"
2. We asked them: "Are you going to support this drift?"
3. He asked them: "Was timber already provided?"

4. They asked: “Is the quantity of air provided by the old downcast sufficient?”
5. He asked them: “Did your shift drive the required length of the level?”
6. They asked: “Does a new upcast remove all contaminated air?”
7. He asked: “Are all workings filled with fire damp?”
8. They asked: “Were this level supported?”
9. He asked them: “Are concrete and steel props used as the supports?”
10. They asked us: “Does your enterprise dress economical minerals?”
11. They asked him: “Did your shift start supporting the driven drift?”
12. He asked them: “Does your mine increase the mining of coal?”

Task 4. Transfer the sentences into Indirect Speech.

1. He said: “We must support this drift”.
2. He said: “They are going to support this drift”.
3. He said: “This drift must be supported next week”.
4. He said: “I had finished working by 4 o’clock”.
5. He said: “Our mine will be closed in 10 years”.
6. They said: “We can provide high quality timber for your enterprise”.
7. He reported: “This branch of industry is not profitable”.
8. They answered: “Materials for supporting were provided three days ago”.
9. He said: “Provided air is not sufficient for respiration”.
10. They said: “We investigated the richness of this deposit”.
11. He asked: “Did your enterprise increase the mining?”
12. They asked: “Were required building materials provided in time?”
13. He asked: “Will this ventilation system provide sufficient quantity of the air?”
14. They asked; “Has this electric lamp any disadvantage?”
15. He asked: “Does your mine decrease amount of mined ore?”
16. He asked: “Are safety lamps still in use?”
17. He asked: “Will any economic minerals be mined in this region in future?”
18. He asked: “Did you support the mining workings?”
19. He asked: “Are they searching for coal in this region?”
20. He asked: “Was this level supported by you?”
21. He ordered: “Drive 100 meters of working!”
22. He asked us: “Don’t use these materials for supporting”.
23. He ordered: “Use only electric lamps in mines with fire damp!”
24. He asked them: “Provide concrete and steel props for supporting”.
25. They asked us: “Ascertain the real extend of the deposit by the end of the month”.
26. He ordered: “Don’t enter this level!”
27. He asked you: “Charge the accumulator of your lamp”.
28. They ordered: “Start sinking the shaft!”.
29. He asked them: “Don’t finish mining coal”.
30. He ordered: “Don’t decrease the mining!”.

Task 5. Translate into English, using Passive Voice and transfer translated sentences into Indirect Speech.

1) Вугілля може видобуватись на цій глибині.
2) Багато мінералів може використовуватись у різноманітних галузях виробництва.
3) Родовище має бути ретельно досліджено.
4) Руду не можна легко транспортувати по цій виробці.
5) Зараз руду не можна рубати через присутність копального газу.
6) Під терміном «розвідка» може розумітись пошук мінералів.
7) Видобуте вугілля має бути збагачено.
8) Шахту можна підготувати прокладанням стволів та веденням штреків від них.
9) Підготовчі виробки мають бути розташовані у такий спосіб, щоб родовище можна було зручно розробляти, а вугілля легко транспортувати.
10) Розвідні штреки повинні вестись так, щоб їх можна було використовувати для розробки.

Task 6. Transfer the Special Questions into Indirect Speech.

1. He asked: “How many tons of ore did your enterprise dress?”
2. They asked: “How long is this level?”
3. They asked us: “What kind of coal did you find in this region?”
4. They asked: “What are you searching for?”
5. We asked them: “What deposit do you investigate?”
6. He asked: “When will you start driving a new ventilating drift?”
7. They asked us: “When are you going to finish sinking this wince?”
8. He asked: “What form has this coal deposit?”
9. They asked him: “When did you ascertain the extend of the deposit?”
10. They asked me: “How many cubic meters of timber do you require?”
11. He asked them: “When did you test the air composition?”
12. We asked them: “How long have you been driving this drift?”
13. He asked us: “How do you transport the ore on the surface?”
14. They asked him: “How many meters of the drift did you drive?”
15. He asked: “Which shift supported this level?”

Task 7. Transfer the following sentences into Indirect Speech, paying attention at Modal Verbs.

Can – could	**may – might**	**must – had to**

1. They said: “We can use concrete and bricks as the support”.
2. He told them: “You may not enter the drift, the content of methane is large”.
3. He said: “Timber cannot be used for the support of this level”.
4. He said: “We must increase the flow of the air through the mine”.
5. He said: “Electric lamps may be used in gas filled workings”.
6. He said: “Ventilation must provide sufficient quantity of the air”.
7. He said: “These workings can stay for centuries without supporting”.
8. He said: “Every miner must carry his light with him” .
9. He said to him: “You can charge your lamp in a lamp room”.
10. He said: “One can test the air composition with a safety lamp”.

Task 8. Translate into English.

1) Він сказав, що вони проклали штрек.
2) Він запитав, чи багато руди видобуло підприємство.
3) Він повідомив, що ствол було прокладено.
4) Він відповів, що видобуток буде збільшено.
5) Вони повідомили про те, що поставили деревину для кріплення.
6) Він сказав, що зарядив лампу.
7) Він сказав, що вони проклали штрек.
8) Він сказав, що кількість вугілля буде збагачена.
9) Він сказав, що повітря, яке постачається, буде недостатньо.
10) Він відповів, що забой буде освітлено.

ENERGY

Capacity to do work is called energy, and when the energy is (due to) motion it is called kinetic energy.

A weight which has been lifted from the floor to the top of a table has had work on it; if we allow the weight to fall back again to the floor it will get velocity, and therefore kinetic energy'. This energy was simply "stored up" in the weight when it was at rest on the table: it had energy due to its position on the table; and we call this energy potential. Or, potential energy is the energy of a mass due to its position. Water, at the top of a waterwheel, has potential energy. As it falls it gradually loses this potential energy, but gets kinetic energy at the same time.

Forms of Energy. — Any matter possesses energy. Hot steam is able to do work, and we may say that heat is a form of energy. Electric current, when passed through a motor, can do work. So electric current is a form of energy. A magnet can lift an iron nail; so

magnetization is another form of energy. The burning of coal generates heat; and in burning, the coal undergoes a chemical change; such a change is called chemic al action. Chemical action is a form of energy. Electric current makes the filament of an electric lamp white-hot and it gives out both light and heat; a part of the energy is in the form of light. Light, therefore, is a form of energy. Thus, energy exists in a variety of forms.

Test

1.Translate sentences and put questions.

l. A magnet can lift an iron nail.

2.Aweight was at rest on the table.

3. Chemical action is a form of energy.

4. Electric current gives out both light and heat.

5.Any matter possesses energy.

2. Answer *YES/NO.*

1. Capacity to do work is called energy,

2.The energy due to motion is called potential energy.

3.The energy due to its position is called potential energy.

4. The burning of coal generates light.

5.Electric current is a form of energy.

3.Put the sentences in negative and interrogative forms.

1. Water falls and loses potential energy.

2.The weight will get velocity.

3.This energy was simply "stored up" in the weight.

4.Electric current made the filament of electric lamp white hot.

5.Hot steam is able to do work.

4.Answer the questions.

1. What forms of energy do you know?

2. What is called energy.

5. Form the sentences using the following words.

1. is, form, of, magnetization, another, energy.

2. the coal, change, a chemical, undergoes.

3. exists, of, in, a variety, energy, forms.

4.the energy, when, motion, due to, kinetic, is , energy, called, is, it.

5. potential, is, of, a mass, due to, energy, its p o sition, the energy.

6. Open the brackets and translate the sentence.

1. Water (to be) at rest and (to have) potential energy .
2. Heat (to be) a form of energy.
3. Weights (то get) velocity.

MATTER

It is well known that any matter is composed of large numbers of very small mass particles called molecules.

They are in a state of continuous motion. In a solid they are closely packed and give to the solid its definite shape. In a liquid, the molecules have a weaker cohesion and travel about with some freedom, so that the liquid takes up the shape of the vessel in which it is contained. In a gas, the molecules are still more mobile and relatively far apart. The cohesive force is small and the gas fills its container and is easily compressed or expanded.

When substances are heated the molecules move more intensely, and expansion or internal pressure arises.

An atom is the smallest particle of matter and it generally exists only in combination with other atoms.

Atoms consist of three kinds of particles — electrons, protons and neutrons, and the numbers of particles determine the kind of element. An electron has a negative electric charge. A proton is positively charged. A neutron is a charge less mass.

The neutrons and protons of an atom are linked together to form a compact nucleus, while the electrons travel in orbits round the nucleus like planets round the sun. The simple hydrogen atom has a single proton as nucleus and a single electron as planet. The atomic weight of an atom is the number of protons and neutrons it contains. The atomic number is the number of protons in the nucleus; normally the number of negative or positive charges is equal, and the atom is electrically balanced.

Test

Continue the sentences

1) It is well known that any matter...
2) When substances are heated ...
3) Atom consists of ...
4) The simple hydrogen atom has ...
5) Molecules are in ...

Translate sentences and put questions:

1. In a solid molecules are closely packed.
2. In a liquid they have a weaker cohesion.
3. In a gas the molecules are still more mobile.
4. Electrons travel in orbits round the nucleus like planets round the sun.
5. An atom is the smallest particle of matter.

Answer the questions.

1. What do atoms consist of?
2. Why is atom electrically balanced?

Make the sentence negative and interrogative.

When substances are heated the molecules move intensely, and expansion or pressure arises.

Define the forms of the following words.

the charges, it is charged, it is, they move, the gas fills, it is known, a solid, It was, it exists, electrically, they are linked, it has, they nave,

Compose the sentences.

1. neutrons, and, the atomic weight, is, protons, of, an atom, the number, of.
2. in the nucleus, the atomic, is, number, of, the number, protons.
3. exists, generally, an atom, in, atoms, other, combination , with.
4. electric, an electron, charge, has, a negative.
5. is, or, equal, charges, normally, positive, the number, of, negative.

Use correct form of verb.

1. This text (translate, is translated, are translated) by the students.
2. A letter (was written, are written, wrote) by him yesterday.

MINING

WHAT IS MINING

Mining is a branch of industry occupied with the search for exploitation, and dressing of economic minerals and rocks.

Many minerals and rocks are today basic raw materials for various branches of industry: coal and oil are the most important sources of heat and energy; metals produced from ores, form the building material for machines, bridges and other constructions; other minerals give the raw materials for the chemical industry; others are used in building; salt is a foodstuff, etc.

The miner has two main tasks; to break out, and to transport to the surface the economic mineral.

Test

Translate the sentences and make up the questions.

1) Mining is occupied with the search for exploitation and dressing of economic minerals and rocks.

2) Some minerals give the raw materials for the chemical industry.

3) Thickness of the deposit must be thoroughly investigated.

4) The opening-up of the mine depends on the position and form of the deposit and on the configuration of the surface.

5) In mountainous areas we simply drive a tunnel to the deposit.

6) When we reach the ore we have access to it.

7) We explore the ore in horizontal and vertical directions.

UNDERGROUND EXPLORATION

Having finished the preliminary prospecting work we can start underground exploration and the opening-up of the mine.

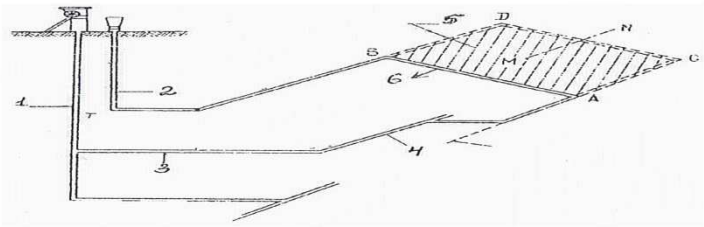
This is done by various horizontal, vertical and inclined •openings, *Drifts, Inclines* and *Shafts* and in many cases by *Boreholes.*

Our first task is to make the deposit accessible, or as the miners say, "to open it up". How this is done depends on the position and form of the deposit, and on the configuration of the surface. In many cases we open the deposit by sinking shafts and by driving horizontally from them to the deposit the so-called *Crosscuts.* In mountainous areas we simply drive a tunnel to the deposit.

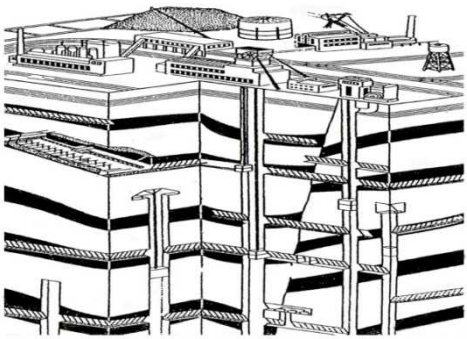
Having reached the ore and thus having access to it we proceed to explore it in horizontal and vertical directions. This is best done by driving *Levels* (or *Drifts)* from the place where our shaft or crosscut has struck it; by sinking *Winzes* in vertical deposits and inclines in inclined deposits.

This work is to explore the deposit, as we do not know whether it will be worth working; we call the drifts *Exploratory drifts*. These are made so that they can be used for mining if the results of the exploration justify us in undertaking it. Thus these exploratory shafts, inclines and drifts are then called the *Development workings*, as they are established in such a manner that they divide the deposit into suitable blocks, which can be conveniently mined and form where the broken ore can be easily transported.

Underground exploration



1. What workings do you know?
2. When can we start underground exploration?
3. How can we open the deposit?
4. How many shafts are there?
5. How are development workings established?



VENTILATION OF MINES

Since men work in mines, a mine has to be ventilated like any other workroom. The air in mines is contaminated not only by the respiration but also, and to a greater extent, by the rotting of timber and the oxidation of carbonaceous matter, and by the use of explosives which may give off poisonous fumes. Accumulations of methane are sometimes stored under pressure in porous rocks.

Carbon dioxide is not only formed by oxidation of timber, coal, and other carbonaceous matter in the workings, but it may already exist in the strata. Some rocks contain hydrogen, especially in the neighborhood of salt deposits.

From this it is evident that the composition of the air in a mine differs somewhat from the composition of the air on the surface.

The purpose of ventilation is to remove the contaminated air and to introduce fresh air.

The purpose of ventilation is first of all to provide a sufficient quantity of air for respiration, and secondly to dilute objectionable gases, vapors and dust. Sometimes it is also necessary for lowering of the air temperature. All deep mines have to contend with high temperature, and much heat is developed in some coal mines by the oxidation of the coal.

Some mines do not require artificial ventilation, the natural flow of air being sufficient.

In large mines natural ventilation is not sufficient, and the air current has to be assisted by fans. This especially refers to coal mines and to mines where methane or carbon dioxide penetrates into the workings and where much dust is produced.

The function of the fan is to increase the flow of air through the mine airways overcoming the resistance of the workings and inertia of the air. A mine ventilated in this way must obviously have two openings, so that the air current may enter in one place, flow through the mine and leave the mine by the second opening. Thus, mines with artificial ventilation must have at least two shafts, one to act as a downcast, and the other as the upcast.

Test

Answer the following questions to the text.

1) What is the air in mines contaminated by?
2) What is carbon dioxide formed by?
3) Why do some mines not require artificial ventilation?
4) What is the function of a fan?
5) What do all deep mines have to contend with?

Compose the sentences using the words from the text.

1) Poisonous, give off, the use, explosives, of, may, fumes.
2) Heat, in, much, is, mines, coal, developed, some.

3) The strata, already, dioxide, may, carbon, exist, in.
4) Objectionable, ventilation, gases, dilutes, and, dust.
5) In, dust, is, produced, much, mines, large.

LIGHTING IN MINES

In nearly all mines the miner carries his light with him. Formerly this was a simple oil-lamp, which was used where there was no danger of fire-damp. Today lamps with carbide are in use. They are used because the light they give is very bright. But the lamp has to be cared for during work.

Electric lamps provided with a small accumulator, which is charged in the lamp-room, are also used. They have a good lighting power, but they are heavy.

In mines with firedamp it is necessary to use either electric lamps or safety lamps. Its flame is surrounded on all sides by a dense wire netting, which prevents the flame from penetrating outside and thus igniting an inflammable mixture outside the lamp. In order that the worker should not be able to open such a lamp at will, it is provided with a magnetic or other type of lock, which can be opened only in the lamp-room with a strong magnet. In the lamp-room the lamps are also filled with fuel and maintained.

Of course, a safety-lamp cannot be lighted with a match or a lighter. Therefore it has to be equipped with a mechanism so that it can be lighted from within.

Electric lamps are very good for mines with firedamp, because their lighting power is great and their safety complete, but they have the great disadvantage that they do not warn the miner of the increasing content of methane in the air. For this reason the overmen and blasters still have safety-lamps even in mines where electric lamps are generally used, so that they can test the composition of the air a t all times. Gas-detector electric lamps are being developed, however.

Test

Translate:

1) danger of fire-damp
2) to give a light
3) to be cared for
4) to be charged in lamp-room
5) to have a good lighting power
6) a safety-lamp
7) the wire netting
8) to penetrate outside
9) a type of lock
10) a strong magnet
11) to be lighting with a match
12) the increasing content of methane

13) the composition of the air

Answer the questions:

1. What types of lamps are used in mines?
2. Where are the lamps maintained?
3. How can a safety-lamp be lighted?
4. Why are electric lamps very good for mines with firedamp?
5. What lamp is being developed now?

THREE STATES OF MATTER

We know that the cohesion between the molecules of a solid body is very great. A solid body retains its form.

When a solid body is heated, the motion of its molecules becomes more rapid. The cohesion among the molecules weakens; the body expands on heating. On further heating, the movement of the molecules becomes still more rapid and the attraction between them diminishes.

Finally, when the motion of the molecules has attained some velocity, the molecules begin to move among other molecules in various directions, chaotically, in disorder. The cohesion has become very much weaker. The body is no longer a solid. It has been transformed into a liquid; it has melted.

On cooling, the above described phenomena occur in exactly the reverse order.

At some temperature the density is so great that the liquid becomes a solid body.

During melting the bond between the molecules becomes considerably weaker than in the solid body. In order to separate the molecules from one another, it is necessary to overcome the attraction between them, it is necessary to perform work to destroy the bonds between the molecules. Overcoming the attraction, the molecules situated on the surface of a liquid escape from the liquid into the air. These are molecules or vapor.

The higher the temperature of the liquid, the greater the number of molecules escapes from the liquid. Hence, when a liquid is heated, the rate of evaporation is increased.

The larger the surface of the evaporating liquid, the greater the number of molecules that can escape from the liquid at the same time.

The velocity of the molecules increases in proportion to the temperature of the liquid and, finally, the velocity becomes so great that the formation of vapor goes on not only on the surface but through the liquid.

Liquids whose molecules are weakly attracted to one another are easily evaporated. Such liquids are called volatile liquids. Less energy is required for their evaporation.

Attraction between molecules of vapor is practically nonexistent. As a result of this, molecules of vapor move in all directions, collide with one another and occupy a vast volume in comparison with the volume of the liquid from which they were formed.

The state of substance depends on the velocity of its molecules.

Test

I. Translate sentences and make up questions.

1. The body expands on heating.
2. A solid body retains its form.
3. When a liquid is heated, the rate of evaporation is increased.
4. In liquids molecules are weakly attracted.
5. Less energy is required for evaporation of volatile liquids.

II. Answer the following questions.

1. What happens when a solid body is heated?
2. What are volatile liquids?
3. What does the state of substance depend on?
4. What is necessary to do in order to separate the molecules from one another?
5. What is attraction between the molecules of vapor like?

III. Use the correct form of the verb.

1. Volatile liquids (evaporate, are evaporated) easily.
2. Molecules of vapor (move, are moved) in all directions.
3. Vast volume (occupies, is occupied) by molecules of vapor.
4. Many molecules escape from the surface of the liquid when it (heats, is heated).
5. In volatile liquids molecules (attract, are attracted) to one another.

IV. Make the sentences negative.

1. The number of molecules can escape from the liquid at the same time.
2. The formation of vapor goes on through the liquid.
3. Molecules collide with one another.
4. Such liquids are called volatile liquids.
5. The density is very great at some temperature.

V. Compose the sentences.

1. Weakens, the, among, molecules, cohesion, the.
2. Molecules, rapid, the, heating, movement, on, becomes, of, more.
3. Longer, a, body, no, solid, is, the.
4. To, chaotically, begin, molecules, move, the.
5. Between, on, attraction, the, diminishes, heating, molecules, the.

MATERIALS FOR THE SUPPORT OF MINE WORKINGS

In firm and coherent rocks the mine workings especially narrow drifts working shafts and similar excavations need not be supported as they will remain for centuries. Even larger workings remain in some rocks for a long time. In most rocks, however, it is necessary to support the mine workings.

Supporting is carried out for a variety of reasons:

1) it prevents the caving of the roof and the warping of the overlying rocks;
2) it protects the miner against falls of rock from the roof or walls;
3) sometimes it keeps the filling or the caved roof in a certain position;
4) it often retains the broken ore before removal;
5) it may serve as scaffolding on which the miner can stand and work even at the back of lofty chambers;
6) it protects the mine working against flooding;
7) it often restricts the access of air to the walls of the levels and drifts and to the gob, and thus prevents the spontenuous combustion of coal and starting of mine fires;
8) it sometimes restricts the access of air and water to the rock and thus prevents its swelling;
9) it prevents the rocks from increasing in volume by recrystallization, as is the case with some rocks in salt deposits;
10) it sometimes prevents weathering of the wall rocks and thus their disintegration;
11) it can also act against gas discharges from the seams by preventing a too rapid and sudden crushing of the coal seams near the face.

In mining the supports used are mainly:

a) pillars of the rock in which the mine is excavated;
b) timber;
c) filling (or stowing), pack filling, with waste material;

d) masonry of stone or bricks;
e) masonry of concrete and cement blocks;
f) pre-cast concrete;
g) solid concrete;
h) reinforced concrete;
i) curved steel (steel sections), and, in shafts, also cast iron;
j) steel props;
k) masses of broken ore;
1) a combination of the materials and methods listed above. The chief method to maintain the mine working is, however, the selection of a suitable method of working.

For each method of support we have to bear in mind for what purpose and for how long we shall need the different sections of the mine. We support quite differently sections which we shall need permanently during the lifetime of the mine, perhaps even for centuries, and sections which serve only for some years or months, or even for only a few weeks or days.

Test

I. Insert the necessary words from the brackets (scaffolding, falls of rock, the access of air, the broken ore, the mine working).

Supporting:
a) protects the miner against ……. from the roof and walls.
b) often retains ……. before removal.
c) protects ……. against flooding.
d) may serve as ……. on which the miner cam stand and work.
e) sometimes restricts ……. and thus prevents the spontaneous combustion.

II. Translate the words into Ukrainian (or Russian).

1) concrete
2) precast concrete
3) reinforced concrete
4) cast iron
5) timber
6) broken ore
7) waste material
8) masonry of stone and bricks
9) steel props
10) pillars of the rock

III. Make up the questions to the underlined words.

1) In firm and coherent rocks the mine workings need not be supported as they will remain for centuries.
2) Supporting may serve as scaffolding.
3) It cam act against gas discharges.
4) Supporting protects the miner against falls of rock.
5) Supporting is carried out for a variety of reasons.

IV. Join the words to make word combinations. Translate them.

1) gas	a) working
2) spontaneous	b) in volume
3) mine	c) combustion of coal
4) weathering	d) discharge
5) increasing	e) of wall rocks

V. Combine the sentences using the following words.

1) Differently, mine, we, workings, support.
2) Supporting, the spontaneous, prevents, of, combustion, coal.
3) To support, necessary, it is, the mine, rocks, in, most, workings.
4) For, this section, years, some, serve, will.
5) This mine, the lifetime, of, long, is, quite.

VI. Find in the text nouns connected with the following adjectives. Translate the word combinations.

1) firm and coherent
2) rapid and sudden
3) suitable
4) different
5) narrow

Перелік рекомендованої літератури

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