

МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ
РОССИЙСКОЙ ФЕДЕРАЦИИ

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ПЕДАГОГИЧЕСКИЙ УНИВЕРСИТЕТ»

Л. Г. Романова

METALS

Учебно-методическое пособие для студентов
очного отделения факультета иностранных языков
по дисциплине
«Научно-технический перевод»

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В пособии представлены тексты, упражнения и задания для развития навыков перевода научно-популярной и специальной технической литературы, устной и письменной монологической и диалогической речи; изучения лексического материала по теме «Metals» и закрепления на основе изученной лексики грамматических структур, а также работы над фонетическими аспектами языка. Издание адресовано преподавателям, ведущим занятия по дисциплине «Научно-технический перевод», и студентам 2—4 курсов факультетов иностранных языков педвузов.

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ПРЕДИСЛОВИЕ

Данное учебно-методическое пособие составлено в помощь преподавателям для проведения занятий по дисциплине «НАУЧНО-ТЕХНИЧЕСКИЙ ПЕРЕВОД», раздел «МЕТАЛЛЫ». Материалы данного пособия могут быть использованы для проведения занятий по практическому курсу перевода английского языка.

Пособие предназначено для студентов 2—4 курсов английского отделения.

Целью предлагаемого учебно-методического пособия является развитие у учащихся навыков перевода специальной технической литературы, а также развития навыков устной и письменной речи, изучение лексического материала по теме «METALS», закрепление на основе изученной лексики грамматических структур, формирование навыков монологической и диалогической речи, перевода научно-популярных и специальных технических текстов, а также работа над фонетическими аспектами языка.

Пособие может быть использовано в группах студентов различного уровня подготовки, поскольку разработка к каждому тексту содержит упражнения разного уровня сложности и построена по принципу «от простого к сложному».

Согласно правилам методики преподавания английского языка, работа над каждым текстом предполагает фонетическую тренировку наиболее сложных слов, ознакомление с лексикой текста, последующее закрепление лексического материала.

Студентам предлагается творчески подойти к письменному и устному переводу текстов, к составлению диалогических и монологических высказываний с использованием изученного вокабуляра. Кроме того, учащиеся получают возможность подготовить информативные сообщения на наиболее актуальные темы в рамках изучаемого аспекта.

В пособие включены научно-популярные и специальные тексты, работа с которыми позволяет не только разви-

вать навыки перевода технического текста, но и тщательно изучить лексику по рассматриваемой теме.

Таким образом, данное учебно-методическое пособие не только призвано способствовать повышению уровня владения английским языком, специальной лексикой, но и развивать умение студентов анализировать, обобщать прочитанное и делать логические умозаключения.

Преподаватели могут эффективно применять все предложенные задания, варьируя их по своему усмотрению, в зависимости от учебного плана, конкретных задач преподавания и языковой подготовленности студентов.

METALS, NON-METALS AND METALLOIDS

Chemical elements. Periodic table

I. Translate, transcribe and pronounce the names of the following elements of periodic table.

H — Hydrogen	Rb — Rubidium
Li — Lithium	Sr — Strontium
Be — Beryllium	Y — Yttrium
Na — Sodium	Zr — Zirconium
Mg — Magnesium	Nb — Niobium
He — Helium	Mo — Molybdenum
B — Boron	Tc — Technetium
C — Carbon	Ru — Ruthenium
N — Nitrogen	Rh — Rhodium
O — Oxygen	Pd — Palladium
F — Fluorine	Ag — Silver
Ne — Neon	Cd — Cadmium
Al — Aluminum	In — Indium
Si — Silicon	Sn — Tin
P — Phosphorus	Sb — Antimony
S — Sulfur	Te — Tellurium
Cl — Chlorine	I — Iodin
Ar — Argon	Xe — Xenon
K — Potassium	Cs — Cesium
Ca — Calcium	Ba — Barium
Sc — Scandium	La — Lathanum
Ti — Titanium	Hf — Hafnium
V — Vanadium	Ta — Tantalum
Cr — Cromium	W — Tungsten
Mn — Manganese	Re — Rhenium
Fe — Iron	Os — Osmium
Co — Cobalt	Ir — Iridium
Ni — Nickel	Pt — Platinum
Cu — Copper	Au — Gold
Zn — Zink	Hg — Mercury
Ga — Gallium	Tl — Thallium
Ge — Germanium	Pb — Lead
As — Arsenic	Bi — Bismuth
Se — Selenium	Po — Polonium
Br — Bromine	At — Astatine
Cr — Krypton	Rn — Radon

Fr — Francium	R — Erbium
Ra — Radium	Tm — Thulium
Ac — Actinium	Yb — Ytterbium
Rf — Rutherfordium	Lu — Lutetium
Db — Dubnium	Th — Actinium
Sg — Seaborgium	Pa — Protactinium
Uub — Ununbium	U — Uranium
Uuq — Ununquadium	Np — Neptunium
Ce — Cerium	Pu — Plutonium
Pr — Praseodymium	Am — Americium
Nd — Neodymium	Cm — Curium
Pm — Promethium	Bk — Berkelium
Sm — Samarium	Cf — Californium
Eu — Europium	Es — Einsteinium
Gd — Gadolinium	Fm — Fermium
Tb — Terbium	Md — Mendelevium
Dy — Dysprosium	No — Nobelium
Ho — Horbium	Lr — Lawrencium

II. Transcribe and pronounce the following words.

Lawrencium, Nobelium, Mendelevium, Hydrogen, Lithium, Beryllium, Sodium, Magnesium, Helium, Boron, Carbon, Nitrogen, Oxygen, Fluorine, Neon, Aluminum, Silicon, Phosphorus, Sulfur, Chlorine, Argon, Potassium, Calcium, Scandium, Titanium, Vanadium, Chromium, Manganese, Iron, Cobalt, Nickel, Copper, Zinc, Gallium, Germanium, Arsenic, Selenium, Bromine, Krypton, Rubidium, Strontium, Yttrium, Zirconium, Niobium, Molybdenum, Technetium, Ruthenium, Rhodium, Palladium, Silver, Cadmium, Indium, Tin, Antimony, Tellurium, Iodine, Xenon, Cesium, Barium, Lanthanum, Hafnium, Tantalum, Tungsten, Rhenium, Osmium, Iridium, Platinum, Gold, Mercury, Thallium, Lead, Bismuth, Polonium, Astatine, Radon, Francium, Radium, Actinium, Rutherfordium, Dubnium, Seaborgium, Ununbium, Ununquadium, Cerium, Praseodymium, Neodymium, Promethium, Samarium, Europium, Gadolinium, Terbium, Dysprosium, Horbium, Erbium, Thulium, Ytterbium, Lutetium, Actinium, Protactinium, Uranium, Neptunium, Plutonium, Americium, Curium, Berkelium, Californium, Einsteinium, Fermium, Mendelevium, Nobelium, Lawrencium.

III. Looking at the following symbols, give the names of the corresponding elements.

H, Li, Be, Na, Mg, He, B, C, N, O, F, Ne, Al, Si, P, S, Cl, Ar, K, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Se, Br, Cr, Rb, Sr, Y, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, In, Sn, Sb, Te, I, Xe, Cs, Ba, La, Hf, Ta, W, Re, Os, Ir, Pt, Au, Hg, Tl, Pb, Bi, Po, At, Rn, Fr, Ra, Ac, Rf, Db, Sg, Uub, Uuq, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, R, Tm, Yb, Lu, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No, Lr.

IV. Translate the following words from Russian into English.

Водород, литий, бериллий, бор, углерод, азот, кислород, фтор, гелий, неон, натрий, магний, алюминий, кремний, фосфор, сера, аргон, калий, кальций, скандий, титан, ванадий, хром, марганец, железо, кобальт, никель, медь, цинк, галлий, германий, мышьяк, селен, хлор, бром, криптон, рубидий, стронций, иттрий, цирконий, ниобий, молибден, технеций, рутений, родий, палладий, серебро, кадмий, индий, олово, сурьма, теллур, йод, ксенон, цезий, барий, гафний, тантал, вольфрам, рений, осмий, иридий, платина, золото, ртуть, таллий, свинец, висмут, полоний, радон, франций, радий, курчатовий, нильсборий, лантан, церий, празеодим, неодим, прометим, самарий, европий, гадолиний, тербий, диспрозий, гольмий, эрбий, тулий, иттербий, лютеций, актиний, торий, протактиний, уран, нептуний, плутоний, америций, кюрий, берклий, калифорний, эйнштейний, фермий, менделевий, нобелий, лоуренсий.

V. Read, translate and pronounce the following English pairs of words.

Hydrogen — nitrogen; hydrogen — oxygen; oxygen — hydrogen; manganese — magnesium; lead — lithium; radon — rhodium; iron — argon; barium — boron; francium — calcium; boron — bromine; fermium — phosphorous;

silicon — selenium; tantalum — thallium; thallium — gallium; horbium — erbium; rhenium — ruthenium; tantalum — thallium; cerium — selenium; polonium — plutonium; chromium — cadmium.

VI. Read, translate and pronounce the following Russian pairs of words.

Галлий — германий; рубидий — иридий; цинк — цирконий; лютеций — лоуренсий; индий — иттрий; тулий — таллий; иттрий — итербий; галлий — гольмий; церий — цезий; бор — бром; углерод — кислород; углерод — водород; фермий — эрбий; рубидий — рутений; родий — радий; торий — рений; криптон — ксенон; тантал — лантан; галлий — таллий; эрбий — фермий.

VII. Read and translate the following information. Speak about the difference between metals, metalloids and nonmetals.

A **metal** (from Greek *métallon*, "mine, quarry, metal") is a material (an element, compound, or alloy) that is typically hard, opaque, shiny, and has good electrical and thermal conductivity. Metals are generally malleable—that is, they can be hammered or pressed permanently out of shape without breaking or cracking—as well as fusible (able to be fused or melted) and ductile (able to be drawn out into a thin wire). About 91 of the 118 elements in the periodic table are metals, the others are nonmetals or metalloids. Some elements appear in both metallic and non-metallic forms. Astrophysicists use the term "metal" to collectively describe all elements other than hydrogen and helium, the simplest two, in a star. The star fuses smaller atoms, mostly hydrogen and helium, to make larger ones over its lifetime. In that sense, the metallicity of an object is the proportion of its matter made up of all heavier chemical elements, not just traditional metals.

Many elements and compounds that are not normally classified as metals become metallic under high pressures; these are formed as metallic allotropes of non-metals.

Источник: <http://www.aldeainternationalgroup.com/en/information-about-metals>

A. Read, translate and transcribe the following words

Mine, quarry, compound, alloy, opaque, thermal conductivity, electrical conductivity, malleable, ductile, to hammer, to press, fusible, periodic table, astrophysicists, hydrogen, helium, metallicity, allotropes.

B. Translate the following words from Russian into English

Шахта, сплав, теплопроводность, электропроводность, периодическая таблица, водород, астрофизик, гелий, аллотропы, металлические свойства, добыча, непрозрачный, соединение.

C. Explain the following terms using your own words

A compound, malleable, opaque, to hammer, fusible, metallicity, to quarry, periodic table, conductivity

D. Translate the following sentences from Russian into English

1. Одна из задач астрофизиков — находить возможность добычи необходимых для человечества металлов и прочих химических элементов на других планетах.

2. Большинство металлов добываются в шахтах.

3. Теплопроводность и электропроводность — важнейшие свойства металлов.

4. Как правило, металлы редко применяются в чистом виде. В сплавах они имеют гораздо больше полезных свойств и качеств.

5. Как правило, металлы непрозрачны.

6. Аллотропы металлов получают за счет того, что неметаллы меняют свои изначальные свойства и приоб-

ретают свойства металлов при определенном воздействии при определенных условиях.

7. Металлоиды имеют свойства металлов и неметаллов.

8. Металлы имеют такое свойство, как плавление при определенных условиях, как правило, связанных с повышением температуры.

9. Металлы имеют свойство изменять форму без поломки под воздействием давления и высоких температур.

10. Обработка металла молотом — один из древнейших способов изготовления изделий из металлов.

VIII. Study the following table. Say, what elements belong to classes of metals, non-metals and metalloids.

Metals, Nonmetals and Metalloids																																													
H																	He																												
Li	Be															B	C	N	O	F	Ne																								
Na	Mg															Al	Si	P	S	Cl	Ar	metals																							
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr																												
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Rd	Ag	Cd	In	Sn	Sb	Te	I	Xe	metalloids																											
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn																												
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Uub	—	Uuq	—	—	—	—	nonmetals																											
<table border="1" style="width: 100%; text-align: center;"> <tr> <td>Ce</td><td>Pr</td><td>Nd</td><td>Pm</td><td>Sm</td><td>Eu</td><td>Gd</td><td>Tb</td><td>Dy</td><td>Ho</td><td>Er</td><td>Tm</td><td>Yb</td><td>Lu</td> </tr> <tr> <td>Th</td><td>Pa</td><td>U</td><td>Np</td><td>Pu</td><td>Am</td><td>Cm</td><td>Bk</td><td>Cf</td><td>Es</td><td>Fm</td><td>Md</td><td>No</td><td>Lr</td> </tr> </table>																		Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu																																
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr																																

Источник: https://yandex.ru/images/search?img_url=https%3A%2F%2F9be7037176ebed526de6-851b178cb1fa40a3535f993be03d0145.ssl.cf2.rackcdn.com%2F23CBBBFC-C8B8-420D-9A40-3729CF3C7F9C.jpg&text=metals%20nonmetals%20metalloids%20table&noreask=1&pos=3&lr=48&rpt=simage

A. Looking at the table above, quickly pronounce the elements in English from left to right

B. Looking at the table, quickly pronounce the names of metals.

C. Divide into two teams. Each team gives names of chemical elements in English, the members of the other team translate them.

D. Divide into two teams. Each team gives names of chemical elements in Russian, the members of the other team translate them.

E. Divide into two teams. Each team gives names of chemical elements in English, the members of the other team quickly say METAL or NONMETAL.

F. Write a dictation of the names of chemical elements on the blackboard.

IX. Study the following table. Read, translate and transcribe the terms. Say, what general physical properties belong to metals and non-metals.

General physical properties of metals and non-metals

Properties	Metals	Non-metals
appearance	shiny	dull
hardness	very hard or hard	brittle
malleability	malleable	non-malleable
ductility	ductile	non-ductile
heat conduction	good conductor	bad conductor
conduction of electricity	good conductor	bad conductor
density	higher	lower

Источник: https://yandex.ru/images/search?img_url=https%3A%2F%2Fd32v6r6fji4k49.cloudfront.net%2Fimages%2Fchemistry%2Fchembook_periodic_graphik_51.png&text=metals%20nonmetals%20metalloids%20table&noreask=1&pos=12&lr=48&rpt=simage

A. Answer the following questions on the information on the table:

1. What is the difference in the appearance of metals and non-metals?

2. What is the difference in the hardness of metals and non-metals?

3. What is the difference in the malleability of metals and non-metals?
4. What is the difference in the ductility of metals and non-metals?
5. What is the difference in the heat conduction of metals and non-metals?
6. What is the difference in the conduction of electricity of metals and non-metals?
7. What is the difference in the state of metals and non-metals?
8. What is the difference in the density of metals and non-metals?

B. Explain the following terms using your own words.

Density, state, solid, a good (bad) conductor, conduction of electricity, heat conduction, liquid, ductility, malleability, brittleness, shiny appearance, dull appearance.

C. Translate the following sentences from English into Russian.

1. Metals are generally characterized as elements which have a solid state and a shiny appearance, so this is the main visible difference between metals and non-metals, which are usually dull and can take a form of solids, liquids and gasses.
2. Being solid, metals are ductile and malleable, so, they can be shaped into any thing, which will be solid too.
3. Non-metals are not malleable and ductile, so it is normally impossible to shape them into a non-brittle thing.
4. Non-metals are poor electricity conductors, that's why some of them are used in production of insulators of wires or special tools.
5. Metals have a good electrical conductivity, it depends on their atomic structure.
6. Being good heat conductors, metals normally have a high heat resistance.
7. Having a low heat conductivity, some of non-metals can be used in production of protective clothing or appliances.

8. Having high density, metals are normally hard.
9. Non-metals are usually brittle, as they have a low density.
10. Shiny appearance of metals has always attracted people, who used metals not only for producing appliances and tools but also various decorations.

D. Translate the following sentences from Russian into English.

1. Большинство металлов имеют твердую структуру, поэтому из них сложно сформировать предмет необходимой формы.

2. Поскольку металлы обладают таким свойством, как ковкость, из них издавна формируют предметы высокой прочности.

3. Ковкость металлов позволяет придать им нужную форму под воздействием высоких температур и давления.

4. Главная отличительная черта металлов и неметаллов — это блестящая поверхность, однако это касается не всех представителей данных групп элементов.

5. Низкая электропроводность большинства неметаллов позволяет применять их для производства оборудования и инструментов по работе с электричеством.

6. Человечество издавна выбирает металлы и неметаллы для производства тех или иных вещей, основываясь на их способности проводить тепло.

7. Будучи в целом прочными и твердыми, металлы могут стать хрупкими при определенных условиях.

8. Хрупкость или твердость вещества зависит от плотности его молекулярной структуры.

9. Блеск металлов издавна привлекал человечество, что и объясняет их высокую ценность, значимость и стоимость.

10. Несмотря на то, что металлы — твердые вещества, они становятся податливыми при определенных условиях.

X. Study the following table. Read, translate and transcribe the terms. Say, what specific physical properties belong to metals and non-metals.

Specific physical properties of metals and non-metals

<i>metals</i>	<i>nonmetals</i>
Metals are usually solids (exceptions: mercury, gallium)	Nonmetals are found in all three states
Metals are heavy (exceptions: sodium, potassium, magnesium)	Nonmetals are usually light in weight
They are hard and non-brittle (exception: potassium, sodium and lead which are soft)	Solid nonmetals are hard but brittle
They are good conductors of heat and electricity (exception: lead)	They are bad conductors of heat and electricity (exception: graphite)
They are ductile and malleable	They are neither ductile nor malleable
Their melting point and boiling point are generally high	Their melting point and boiling point are generally low
They generally produce ringing sound on collision	They do not produce ringing sound on collision
They are generally lustrous and can be polished	They are generally non-lustrous and cannot be polished

Источник: https://yandex.ru/images/search?img_url=http%3A%2F%2Fwww.askpins.com%2Fpics%2F268%2Fwhat-are-properties-of-metals-.jpg&p=2&text=metals%20nonmetals%20metalloids%20table&noreask=1&os=65&rpt=simage&lr=48

A. Answer the following questions on the information on the table:

- What are the three general states of substances?
- What are the general state of metals?
- What metals are not solid?
- What metals are not heavy?
- What metals cannot be characterized as non-brittle?
- What metal is a bad conductor of electricity?
- What non-metal is a good conductor of electricity?
- What are the boiling points of metals and non-metals?
- What sounds do metals and non-metals produce on collision?

- What substances are easily polished?
- What substances are lustrous?

B. Explain the following terms using your own words.

Lustrous, non-lustrous, collision, ringing sound, boiling point, melting point, brittleness, electro conductivity, heat conductivity, solid state, liquid state, gas state.

C. Translate the following sentences from English into Russian.

- Metals normally produce ringing sound on collision.
- Metals are stereotypically solid, but the exceptions are mercury and gallium.
- Nonmetals are found in solid, liquid or gas states as this term denotes the range of substances which do not belong to the class of metals.
- Nonmetals are usually described as brittle, but it can be applied only to solid nonmetals.
- Graphite is a non-metallic substance which is characterized as a bad conductor of electricity.
- Ductility and malleability are certain characteristics of metals, which denote their ability to change their shape under such conditions as high temperatures and pressure.

D. Translate the following sentences from Russian into English.

- Температура кипения многих неметаллических веществ примерно 100 градусов по Цельсию, однако многие вещества имеют значительные отклонения от этой цифры.
- Температура плавления металлов, как правило, весьма высока, однако ряд металлов плавятся при сравнительно низкой температуре.
- Наличие блестящей поверхности отнюдь не является признаком того, что вещество принадлежит к классу металлов.
- Металлы, как правило, имеют блестящую поверхность, но есть ряд исключений.

- Большинство металлов поддаются полировке, хотя есть ряд металлов, состояние которых ранжируется от твердого к жидкому, поэтому полировка невозможна.

- Стереотипное описание металлов — это блестящая поверхность, которую можно отполировать, и способность производить звенящий звук, однако некоторые металлы не имеют таких характеристик.

- Температуры кипения и плавления большинства неметаллов, как правило, значительно ниже, чем у металлов, однако это относится лишь к наиболее часто применяемым в промышленности и быту веществам.

- Неметаллические вещества, как правило, значительно легче по весу, чем металлы.

- Большинство металлов ассоциируется с железом и сталью, поскольку данные виды металлов применяются в повседневной жизни чаще всего.

- Такие характеристики, как твердость и блестящая поверхность, наиболее часто приписываются большинству металлов, поскольку наиболее привычные из них имеют данные физические свойства.

XI. Study the following table. Read, translate and transcribe the terms. Say, how metals react with other substances.

A. Answer the following questions on the information on the table:

- What is the chemical substance, produced as the result of reaction of metals with water?

- What is the chemical substance, produced as the result of reaction of metals with dilute acids?

- What is the chemical substance, produced as the result of reaction of metals with oxygen?

- What metals do not react with water or steam?

- What metals do not react with oxygen?

- What metals react with oxygen?

Reactivity of metals with other substances

Characteristics	Reactivity of metal with			
	water	Dilute acids	oxygen	
	hydrogen	hydrogen	none	
Chemical substances produced	Alkaline solution (metal hydroxide)	salt	Metal oxide	
Reactivity series: Potassium Sodium Calcium Cesium Magnesium Aluminum Zinc Iron Tin lead	Potassium Sodium Calcium Magnesium Aluminum Zinc Iron Tin	Potassium Sodium Calcium Magnesium Aluminum Zinc Iron Tin Lead	Potassium Sodium Calcium Magnesium Aluminum Zinc Iron Copper Tin Mercury	Very reactive React
Copper Mercury Silver Gold	Do not react with water or steam	Copper Mercury Silver Gold	Do not react at all	Do not react at all

Источник: https://yandex.ru/images/search?img_url=http%3A%2F%2Fwww.askpins.com%2Fpics%2F268%2Fwhat-are-properties-of-metals-.jpg&p=2&text=metals%20nonmetals%20metalloids%20table&noreask=1&pos=65&rpt=simage&l=48

- What metals react with water at room temperature?
- What metals react with steam?
- Under what conditions do some metals react with dilute acids?
- What metals do not react with dilute acids at all?

B. Read and translate the following descriptions of chemical elements. Be ready to speak about their physical and chemical properties.

- **Copper** is a chemical element with symbol **Cu** (from Latin: *cuprum*) and atomic number 29. It is a soft, malleable, and ductile metal with very high thermal and electrical conductivity. A freshly exposed surface of pure copper has a reddish-orange color. Copper is used as a conductor of heat and electricity, as a building material, and as a constituent of various metal alloys, such as sterling silver used in jewelry, cupronickel used to make marine hardware and coins, and constantan used in strain gauges and thermocouples for temperature measurement.

Источник: <https://en.wikiquote.org/wiki/Copper>

- **Mercury** is a chemical element with symbol **Hg** and atomic number 80. It is commonly known as **quicksilver** and was formerly named **hydrargyrum** (/haɪˈdrɑːrdʒərəm/). A heavy, silvery element, mercury is the only metallic element that is liquid at standard conditions for temperature and pressure; the only other element that is liquid under these conditions is bromine, though metals such as caesium, gallium, and rubidium melt just above room temperature.

Источник: [https://en.wikipedia.org/wiki/Mercury_\(element\)](https://en.wikipedia.org/wiki/Mercury_(element))

- **Silver** is a metallic element with symbol **Ag** and atomic number 47. A soft, white, lustrous transition metal, it exhibits the highest electrical conductivity, thermal conductivity, and reflectivity of any metal. The metal is found in the Earth's crust in the pure, free elemental form ("native silver"), as an alloy

with gold and other metals, and in minerals such as argentite and chlorargyrite. Most silver is produced as a byproduct of copper, gold, lead, and zinc refining. Silver is more abundant than gold, but it is much less abundant as a native metal.

Источник: <https://prezi.com/b2eefwvhmqoj/silver-is-a-soft-white-lustrous-transition-metal-it-has-t/>

- **Gold** is a chemical element with symbol **Au** (from Latin: *aurum*) and atomic number 79. In its purest form, it is a bright, slightly reddish yellow, dense, soft, malleable, and ductile metal. Chemically, gold is a transition metal and a group 11 element. It is one of the least reactive chemical elements and is solid under standard conditions. Gold often occurs in free elemental (native) form, as nuggets or grains, in rocks, in veins, and in alluvial deposits. It occurs in a solid solution series with the native element silver (as electrum) and also naturally alloyed with copper and palladium. Less commonly, it occurs in minerals as gold compounds, often with tellurium (gold tellurides).

Источник: <https://ru.scribd.com/document/300407641/Gold>

- **Lead** is a chemical element with atomic number 82 and symbol **Pb** (after the Latin *plumbum*). When freshly cut, it has a bluish-white color that soon tarnishes to a dull gray upon exposure to air. Lead is a soft, malleable, and heavy metal; its density exceeds that of most common materials. Lead has the second highest atomic number of all practically stable elements. As such, it is located at the end of three major decay chains of heavier elements, which, in part, accounts for lead's relative abundance: its stability exceeds those of other similarly numbered elements.

Источник: <http://worldmetalsource.com/products/>

- **Tin** is a chemical element with symbol **Sn** (for Latin: *stannum*) and atomic number 50. It is a post-transition metal in group 14 of the periodic table. It is obtained chiefly from the

mineral cassiterite, which contains tin dioxide. Metallic tin is not easily oxidized in air.

Источник: <https://en.wikipedia.org/wiki/Tin>

- **Iron** is a chemical element with symbol **Fe** (from Latin: *ferrum*) and atomic number 26. It is a metal in the first transition series. It is by mass the most common element on Earth, forming much of Earth's outer and inner core. It is the fourth most common element in the Earth's crust. Its abundance in rocky planets like Earth is due to its abundant production by fusion in high-mass stars, where it is the last element to be produced with release of energy before the violent collapse of a supernova, which scatters the iron into space.

Источник: <http://www.thinglink.com/scene/716657218392424448>

- **Aluminium** or **aluminum** (in North American English) is a chemical element in the boron group with symbol **Al** and atomic number 13. It is a silvery-white, soft, nonmagnetic, ductile metal. Aluminium is the third most abundant element in the Earth's crust (after oxygen and silicon) and its most abundant metal. Aluminium makes up about 8% of the crust by mass, though it is less common in the mantle below. Aluminium metal is so chemically reactive that native specimens are rare and limited to extreme reducing environments. Instead, it is found combined in over 270 different minerals. The chief ore of aluminium is bauxite. Aluminium is remarkable for the metal's low density and its ability to resist corrosion through the phenomenon of passivation. Aluminium and its alloys are vital to the aerospace industry and important in transportation and structures, such as building facades and window frames. The oxides and sulfates are the most useful compounds of aluminium.

Источник: <https://en.wikipedia.org/wiki/Aluminium>

- **Magnesium** is a chemical element with symbol **Mg** and atomic number 12. It is a shiny gray solid. Magnesium is the

ninth most abundant element in the universe. Magnesium is the eighth most abundant element in the Earth's crust and the fourth most common element in the Earth (after iron, oxygen and silicon), making up 13% of the planet's mass and a large fraction of the planet's mantle. It is the third most abundant element dissolved in seawater, after sodium and chlorine.

Источник: <https://en.wikipedia.org/wiki/Magnesium>

- **Calcium** is a chemical element with symbol **Ca** and atomic number 20. Calcium is a soft gray alkaline earth metal, fifth-most-abundant element by mass in the Earth's crust. Free calcium metal is too reactive to occur in nature. Calcium is an essential trace element in living organisms. It is the most abundant metal by mass in many animals, and it is an important constituent of bone, teeth, and shells. In cell biology, the movement of the calcium ion into and out of the cytoplasm functions as a signal for many cellular processes. Calcium carbonate and calcium citrate are often taken as dietary supplements. Calcium is on the World Health Organization's List of Essential Medicines.

Источник: <https://en.wikipedia.org/wiki/Calcium>

- **Sodium** is a chemical element with symbol **Na** (from Latin *natrium*) and atomic number 11. It is a soft, silvery-white, highly reactive metal. Sodium is an alkali metal. The free metal does not occur in nature, but must be prepared from compounds. Sodium is the sixth most abundant element in the Earth's crust, and exists in numerous minerals such as feldspars, sodalite and rock salt. Many salts of sodium are highly water-soluble: sodium ions have been leached by the action of water from the Earth's mineral over eons, and thus sodium and chlorine are the most common dissolved elements by weight in the oceans.

Источник: <https://en.wikipedia.org/wiki/Sodium>

- **Potassium** is a chemical element with symbol **K** and atomic number 19. It was first isolated from potash, the ashes

of plants, from which its name derives. In the periodic table, potassium is one of the alkali metals. Potassium in nature occurs only in ionic salts. Elemental potassium is a soft silvery-white alkali metal that oxidizes rapidly in air and reacts vigorously with water, generating sufficient heat to ignite hydrogen emitted in the reaction and burning with a lilac-colored flame. It is found dissolved in sea water (which is 0.04% potassium by weight), and is part of many minerals.

Источник: <https://en.wikipedia.org/wiki/Potassium>

C. Translate the following sentences from Russian into English.

- Такие металлы, как железо, золото, медь, серебро и многие другие не имеют реакций с водой, кислородом или паром. Они электропроводимы и тверды при обычных условиях.

- Есть ряд металлов, которые относятся к щелочным металлам, и группа, относящаяся к щелочно-земельным металлам. Это определяет их физические и химические свойства.

- Большинство металлов находятся в земной коре и являются ее основными элементами.

- Не все металлы способны противостоять коррозии.

- Большинство металлов реагируют с растворимыми кислотами, выделяя соль.

- Ни серебро, ни золото не реагируют с кислородом.

- При реакции с кислородом кальций производит оксиды.

- Кальций реагирует с водой при комнатной температуре.

- Алюминий — сравнительно легкий металл, не подверженный коррозии и относительно дешевый, поэтому его широко применяют при производстве самолетов, машин, станков и прочих устройств.

- Калий — сильно реагирующий с водой металл, незаменимый для организма химический элемент.

- Кальций представляет собой химический элемент, металл, легко и быстро реагирующий с кислородом и водой.

- Кальций является незаменимым компонентом для живых организмов, поскольку входит в состав костей, зубов и ногтей.

- Магний растворим в воде, реагирует с кислородом, при реакции с кислотами выделяет соль.

- Натрий представляет собой химически реактивный металл. Он реагирует с кислородом, водой и кислотами.

- Медь в чистом виде представляет собой металл красновато-рыжего цвета. Он не реагирует с водой, паром, некоторыми кислотами, но вступает в реакцию с кислородом.

D. Make a report on radioactive elements, their physical and chemical elements.

E. Make a report on general physical properties of metals.

F. Make a report about metals that are components of the Earth crust.

G. Make up Russian-English dialogues for your group-mates to translate:

- Two owners of a metallurgic plant discussing metals as materials and their basic properties;

- a Russian and an English student of the department of chemistry speaking about properties and peculiarities of different metals;

- two businessmen who want to start their own metallurgy plant;

- two proprietors trading metals and discussing their peculiarities.

TEXT A

METALS

I. Read and translate the text.

In chemistry, a **metal** (Greek: *Metallon*) is an element that readily loses electrons to form positive ions (cations) and has metallic bonds between metal atoms. Metals form ionic bonds with non-metals. They are sometimes described as a lattice of positive ions surrounded by a cloud of delocalized electrons. The metals are one of the three groups of elements as distinguished by their ionization and bonding properties, along with the metalloids and nonmetals. On the periodic table, a diagonal line drawn from boron (B) to polonium (Po) separates the metals from the nonmetals. Most elements on this line are metalloids, sometimes called semi-metals; elements to the lower left are metals; elements to the upper right are nonmetals.

An alternative definition of metals is that they have overlapping conduction bands and valence bands in their electronic structure. This definition opens up the category for metallic polymers and other organic metals, which have been made by researchers and employed in high-tech devices. These synthetic materials often have the characteristic silvery-grey reflectiveness (luster) of elemental metals.

The traditional definition focuses on the bulk properties of metals. They tend to be lustrous, ductile, malleable, and good conductors of electricity, while nonmetals are generally brittle (if solid), lack luster, and are insulators.

Источник: <http://schools-wikipedia.org/wp/m/Metal.htm>

II. Write out all the words denoting chemical elements and terms from the text, find their transcriptions and Russian equivalents.

III. Write out all the words denoting physical qualities of metals, look their transcription and translation up in the dictionary.

IV. Translate the following word combinations from English into Russian.

To lose electrons, to form ions, cations, metallic bonds, metal atoms, non-metals, a lattice of positive ions, to be surrounded, a cloud of delocalized electrons, to be distinguished by smth, ionization, bounding properties, metalloids, semi-metals, the periodic table, boron, polonium, overlapping conduction bonds, valence bonds, electronic structure, polymers, a researcher, high-tech devices, synthetic materials, silvery-grey reflectiveness, luster, to focus on, bulk properties, to tend to do smth, lustrous, ductile, malleable, a good conductor of electricity, brittle, an insulator.

V. Translate the following word combinations from Russian into English.

Образовывать ионы, хороший проводник электричества, иметь тенденцию к, хрупкий, катион, серебристо-серое свечение, диэлектрик, сосредоточиться на, электронная структура, полимер, ковкий, исследователь, полоний, пластичный, периодическая система, ион, ионизация, глянец-вый, металлоиды, объемные свойства, валентные связи, блеск, ограничивающие свойства, определяться чем-то, облако делокализованных электронов, терять электроны, атомы металла, бор.

VI. Explain the following terms using your own words.

Metallic bonds, cations, ions, valence bonds, bulk properties, metalloids, electrons, polymers, electronic structure, luster, synthetic materials, an insulator, brittle, periodic table, malleable, high-tech devices.

VII. Translate from English into Russian.

1. Different substances have different bulk properties.
2. Metals are ductile and malleable, that's why people have used them in heavy industry.
3. Metal atoms form regular structures.

4. In the periodical system there are boron and polonium next to metals and semi-metals.

5. Every substance has its own electronic structure and that distinguishes the properties of the substances.

6. Metals tend to have silvery-grey reflectiveness and luster.

7. Researchers study the structure and properties of metals.

8. Metals in combination with synthetic materials are used for production of high-tech devices.

VIII. Fill in the gaps.

1. ... is the boundary between molecules within metals.

2. ... are chemical elements with properties in between of those of metals and non-metals.

3. ... a substance that resists electricity.

4. ... is a tabular arrangement of the chemical elements, organized on the basis of their atomic number.

5. ... is a low-abundance element in the earth crust.

6. ... are molecules in a molecule, ion or solid metal that are not associated with a single atom or one covalent bond.

7. ... is the state of motion of electrons in an electrostatic field by stationary nuclei.

8. ... is a rare and radioactive element.

9. ... is an atom or molecule in which the total number of electrons is not equal to the total number of protons.

IX. Translate from Russian into English.

1. Вещества отличаются по количеству валентных связей.

2. Металлоиды имеют качества как металлов, так и неметаллов и по составу стоят где-то между ними.

3. Металлы имеют такие свойства, как ковкость и пластичность, но без закалки изделия из них становятся хрупкими.

4. В земной коре встречается ряд редких и радиоактивных элементов.

5. В различных веществах молекулы сцеплены между собой различными связями.

6. Большим прорывом в химии было создание периодической системы элементов, в котором все элементы расположены согласно числу атомов в молекуле.

7. Полоний является радиоактивным элементом.

8. В наше время исследователи создают большое количество синтетических материалов, которые используются в высоких технологиях.

X. Make up 10 sentences about metals and their chemical and physical properties in English for your fellow-students to translate.

XI. Act out a monologue of a professor of chemistry in Russian for your fellow-students to translate into English. Speak about metals and their physical and chemical properties.

XII. Make up Russian-English dialogues for your group-mates to translate:

- Two owners of a metallurgic plant discussing metals as materials and their basic properties;

- a Russian and an English student of the department of chemistry speaking about properties and peculiarities of different metals;

- two businessmen who want to start their own metallurgy plant;

- two proprietors trading metals and discussing their peculiarities.

TEXT B

CHEMICAL PROPERTIES OF METALS

I. Read and translate the following text.

Most metals are chemically reactive, reacting with oxygen in the air to form oxides over changing timescales (for example iron rusts over years and potassium burns in seconds). The alkali metals react quickest followed by the alkaline earth metals, found in the leftmost two groups of the periodic table

The transition metals take much longer to oxidize (such as iron, copper, zinc, nickel). Others, like palladium, platinum and gold, do not react with the atmosphere at all. Some metals form a barrier layer of oxide on their surface which cannot be penetrated by further oxygen molecules and thus retain their shiny appearance and good conductivity for many decades (like aluminium, some steels, and titanium). The oxides of metals are basic (as opposed to those of nonmetals, which are acidic), although this may be considered a rule of thumb, rather than a fact.

Painting, anodising or plating metals are good ways to prevent their corrosion. However, a more reactive metal in the electrochemical series must be chosen for coating, especially when chipping of the coating is expected. Water and the two metals form an electrochemical cell, and if the coating is less reactive than the coatee, the coating actually *promotes* corrosion.

Источник: <http://www.chemeurope.com/en/encyclopedia/Metal.html>

II. Write out all the words denoting chemical elements and terms from the text, find their transcriptions and Russian equivalents.

III. Write out all the words denoting physical qualities of metals, look their transcription and translation up in the dictionary.

IV. Translate the following word combinations from English into Russian.

Chemically reactive, to react with oxygen, to form oxides, to change timescales, to rust, potassium, alkali metals, alkaline earth metals, transition metals, to oxidize, iron, copper, zinc, nickel, palladium, platinum, to form a barrier layer of oxide, surface, to penetrate, to retain one's shiny appearance, good conductivity, steel, titanium, acidic, a rule of thumb, to anodize metals, to prevent corrosion, to coat, to form an electrochemical cell, a coating, to promote corrosion.

V. Translate the following word combinations from Russian into English.

Способствовать коррозии, поверхность покрытия, химически активный, анодировать металлы, медь, кислотный, образовывать электрохимические ячейки, проникать, образовывать оксиды, сохранять блестящую поверхность, противостоять коррозии, покрывать, домисел, платина, хорошая электропроводимость, никель, цинк, образовывать защитный барьер из оксидов, переходные металлы, палладий, сталь, поверхность, щелочноземельные металлы, медь, титан, железо.

VI. Explain the following terms using your own words.

Corrosion, to coat, an electrochemical cell, a coating, a rule of thumb, chemically reactive, to anodize metals, conductivity, to form oxides, transition metals.

VII. Translate from English into Russian.

1. Metals are chemically reactive. They react with oxygen and some of them are subject to corrosion.

2. Precious metals retain their shiny appearance as they are not subject to rust.

3. Such a simple method as painting helps to prevent corrosion.

4. Some metals tend to form a barrier layer of oxide when they react with oxygen and do not lose their shiny appearance.
5. When metals oxidize they rust.
6. Oxidizing promotes corrosion.

VIII. Fill in the gaps.

1. ... are silvery-coloured when pure, soft and have only one electron in the outermost shell.
2. ... is a process that leads to the transformation of one set of chemical substances to another.
3. ... is a chemical element which is a soft silvery-white alkali metal.
4. ... is a chemical element which is nonmetallic. It is highly reactive and it readily forms compounds.
5. ... one of the most common elements on Earth, forming much of Earth's outer and inner core.
6. ... is red oxide formed by the redox reaction of iron and oxygen in the presence of water or air moisture.
7. ... is soft and malleable, has a reddish-orange colour.
8. ... is a dense, malleable, ductile, highly uncreative, precious, grey-white transition metal.
9. ... is a transition metal. It is hard and ductile. It is silvery-white with a slight golden tinge.
10. ... is an alloy of iron and carbon. It has high tensile strength.
11. is an electrolytic passivation process.
12. ... is highly resistant to corrosion in sea water and chlorine.

IX. Translate from Russian into English.

1. Платина считается драгоценным металлом, потому что он редкий, не подвержен коррозии и сохраняет блестящую поверхность.
2. Один из самых распространенных металлов — это железо. Его, как правило, применяют в сплавах или покрывают слоем краски, потому что он склонен к коррозии.

3. Ржавчина появляется в результате реакции металла с кислородом, который содержится в воздухе.

4. Металлы имеют хорошую электропроводимость.

5. Как правило, металлы обладают ковкостью и гибкостью.

6. Кислород — это элемент, который не принадлежит к группе металлов.

7. Для предотвращения коррозии применяют анодирование или просто покраску.

X. Make up 10 word combinations on the topic in Russian for your fellow-students to translate.

XI. Make up 10 word combinations on the topic English for your fellow-students to translate.

XII. Make up 10 sentences about metals and their chemical and physical properties in Russian for your fellow-students to translate.

XIII. Act out a monologue of the owner of a metallurgical plant in English for your fellow-students to translate into Russian. Speak about your plant and production, metals and their physical and chemical properties.

XIV. Make up Russian-English dialogues for your group-mates to translate:

- Two owners of a metallurgic plant discussing your production, metals as materials and their basic properties;

- a Russian and an English student of the department of chemistry speaking about properties and peculiarities of different metals and the ways of their applying;

- two businessmen who want to start their own metallurgy plant and discuss the perspective production and the ways of its merchandizing;

- two proprietors trading metals and discussing their peculiarities, ways of application.

TEXT C

PHYSICAL PROPERTIES OF METALS

I. Read and translate the following text.

Traditionally, metals have certain characteristic physical properties: they are usually shiny (they have *metallic luster*), have a high density, are ductile and malleable, have a high melting point, are hard, are usually a solid at room temperature and conduct electricity, heat and sound well. While there are several metals that are low density, soft, and have low melting points, these (the alkali and alkaline earth metals) are extremely reactive, and are rarely encountered in their elemental, metallic form.

The electrical and thermal conductivity of metals originate from the fact that in the metallic bond the outer electrons of the metal atoms form a gas of nearly free electrons, moving as an electron gas in a background of positive charge formed by the ion cores. Good mathematical predictions for electrical conductivity, as well as the electrons' contribution to the heat capacity and heat conductivity of metals can be calculated from the free electron model, which does not take the detailed structure of the ion lattice into account.

When considering the exact band structure and binding energy of a metal, it is necessary to take into account the positive potential caused by the specific arrangement of the ion cores — which is periodic in crystals. The most important consequence of the periodic potential is the formation of a small band gap at the boundary of the Brillouin zone. Mathematically, the potential of the ion cores is treated in the nearly-free electron model.

Источник: <http://schools-wikipedia.org/wp/m/Metal.htm>

II. Write out all the words denoting chemical elements and terms from the text, find their transcriptions and Russian equivalents.

III. Write out all the words denoting physical qualities of metals, look their transcription and translation up in the dictionary.

IV. Translate the following word combinations from English into Russian.

Physical properties, metallic luster, high density, a high melting point, solid, room temperature, to conduct electricity, to conduct heat, to conduct sound, low density, a low melting point, to be extremely reactive, alkali metals, alkaline earth metals, electrical conductivity, thermal conductivity, metallic bond, outer electrons, heat capacity, free electron model, ion lattice, band structure of metals, binding energy, positive potential, arrangement of the ion cores, periodic potential, band gap, brillouin gap.

V. Translate the following word combinations from Russian into English.

Модель свободного электрона, организация ионных остовов, зона бриллюэна, ионная решетка, периодический потенциал, позитивный потенциал, плотный, физические свойства, щелочноземельные металлы, теплоемкость, металлический блеск, металлическая связь, проводить тепло/электричество/звук, высокая плотность, низкая плотность, внешние электроны, комнатная температура, зонная структура металлов, энергия связи, запрещенная энергетическая зона, теплопроводимость, электропроводимость, щелочные металлы, высокая температура плавления, низкая температура плавления, чрезвычайно реактивный.

VI. Explain the following terms using your own words.

To conduct electricity, metallic bond, high density, extremely reactive, ion lattice, a low melting point, metallic luster, thermal conductivity, outer electrons, band gap.

VII. Translate from English into Russian.

1. The melting point is the temperature at which a substance changes its state from solid to liquid at atmosphere pressure.

2. Lithium, sodium, potassium, rubidium, caesium and francium are alkali metals.

3. Alkaline earth metals are beryllium, magnesium, calcium, strontium, barium and radium.

4. The free electron model is a simple model for the behaviour of valence electrons in a crystal structure of a metallic solid.

5. Ion lattice is a regular, repeating arrangement of positive and negative ions.

6. Binding energy is the energy required to disassemble a whole system into separate parts.

7. The standard physical properties of the majority of metals are metallic luster, high density, high electrical, thermal and sound conductivity.

8. There are metals which don't have usual physical properties.

9. Alkali and alkaline earth metals are extremely reactive.

10. Alkali and alkaline earth metals have low melting points and low density.

VIII. Fill in the gaps.

1. Metals have certain ...

2. Metals are ... and have ...

3. Metals are ... at room temperature.

4. ... and ... metals are extremely reactive.

5. Alkali and alkaline metals have ...

6. Heat capacity and heat conductivity of metals can be calculated from...

7. The specific ... is periodic in crystals.

8. Metals conduct ..., ... and ... well.

IX. Translate from Russian into English.

1. Не все металлы имеют высокую температуру плавления.

2. Металлы характеризуются высокой электро- и звукопроводностью.

3. Щелочные и щелочноземельные металлы очень реактивны и имеют низкую температуру плавления.

4. Металлы имеют высокую электро- и теплопроводность благодаря особенностям атомной структуры металлов.

5. Практически все металлы характеризуются блеском и высокой плотностью.

6. Чем меньше размеры зерна в структуре металла, тем он плотнее.

7. Так как металлы имеют высокую электропроводность, провода, как правило, снабжены изоляцией.

8. Блеск металла зависит от его структуры. Чем меньше размер зерна, тем больше блеска.

9. Металлы, имеющие структуру из крупного зерна, имеют низкую плотность.

10. При комнатной температуре металлы, как правило, находятся в твердом состоянии.

11. Щелочные и щелочноземельные металлы, как правило, мягкие и чрезвычайно реактивные.

X. Make up 10 word combinations on the topic in Russian for your fellow-students to translate.

XI. Make up 10 word combinations on the topic English for your fellow-students to translate.

XII. Make up 10 sentences about metals and their chemical and physical properties in Russian for your fellow-students to translate.

XIII. Act out a monologue of the owner of a metallurgical plant in English for your fellow-students to translate into Russian. Speak about your plant and production, metals and their physical and chemical properties.

XIV. Make up Russian-English dialogues for your group-mates to translate:

- Two owners of a metallurgic plant discussing your production, metals as materials and their basic properties, the ways of applying and merchandising of the production;
- a Russian and an English student of the department of chemistry speaking about properties and peculiarities of different metals and the ways of their applying;
- two businessmen who want to start their own metallurgy plant and discuss the perspective production and the ways of its merchandizing;
- two proprietors trading metals and discussing their peculiarities, ways of application, trading and advertizing.

TEXT D

CATEGORIES OF METALS

I. Read and translate the following text.

Base metal

In chemistry, the term '*base metal*' is used informally to refer to a metal that oxidizes or corrodes relatively easily, and reacts variably with dilute hydrochloric acid (HCl) to form hydrogen. Examples include iron, nickel, lead and zinc. Copper is considered a base metal as it oxidizes relatively easily, although it does not react with HCl. It is commonly used in opposition to noble metal.

In alchemy, a **base metal** was a common and inexpensive metal, as opposed to precious metals, mainly gold and silver. A longtime goal of the alchemists was the transmutation of base metals into precious metals.

In numismatics, coins used to derive their value primarily from the precious metal content. Most modern currencies are fiat currency, allowing the coins to be made of **base metal**.

Источник: <http://dic.academic.ru/dic.nsf/metallurgy/369/Base>

II. Write out all the words denoting chemical elements and terms from the text, find their transcriptions and Russian equivalents.

III. Write out all the words denoting physical qualities of metals, look their transcription and translation up in the dictionary.

IV. Translate the following word combinations from English into Russian.

Base metal, to oxidize, to corrode, relatively easy, to react variably with smth, dilute, hydrochloric acid, to form hydrogen, iron, nickel, lead, zinc, copper, noble metal, alchemy, a common metal, inexpensive, a precious metal, a longtime goal, an alchemist, transmutation of base metals into precious metals, numismatics, to derive one's value, flat currency.

V. Translate the following word combinations from Russian into English.

Неразменная валюта, алхимик, меняться в цене, преобразование простых металлов в драгоценные, нумизматика, базовый металл, благородный металл, драгоценный металл, образовывать водород, корродировать, цинк, алхимия, окисляться, иметь различные реакции, разбавленный, медь, недорогой, никель, давняя цель, простой металл, свинец, железо.

VI. Explain the following terms using your own words.

Base metal, transmutation of base metals, numismatics, currency, precious metals, to corrode, to derive one's value.

VII. Translate from English into Russian.

1. The most cherished and longtime goal of alchemists was to produce transmutation of base metals into precious metals.

2. When base metals react with dilute hydrochloric acid they usually form hydrogen.

3. Iron, nickel, lead, zinc and copper are considered to be base metals. They are relatively inexpensive and are named common in opposition to noble metals.

4. Alchemy is a great history of scientists mistakes, prejudices and unfulfilled goals.

5. Alchemy is the mother of contemporary chemistry.
6. Gold and silver are precious metals because they have beautiful luster and do not corrode.
7. Corrosion is a process of forming rust as a result of oxidizing of metals due to reaction with oxygen in the presence of water.
8. Fiat currency is a very convenient monetary system as coins do not derive their value in spite of the alloy they are produced from.
9. In numismatics coins derive their value because of the content of precious metals in them.
10. Numismatics is a hobby connected with the history of coins and currencies.

VIII. Fill in the gaps.

1. Base metals ... with different substances.
2. Base metals are ..., ..., ..., ..., ...
3. Base metals ... because of contacts with air.
4. Base metals ... because of contacts with oxygen and moisture.
5. The reaction with ... acid forms ...
6. ... are more expensive than ...
7. ... was a longtime dream of
8. ... dreamt to get ... metals of common metals.
9. ... is a hobby of collecting coins.
10. ... hydrochloric acid reacting with base metals form ...

IX. Translate from Russian into English.

1. Нумизматика занимается историей возникновения монет, различных денежных знаков и их ценностью. Для нумизматов ценность монеты зависит от сплава, из которой она произведена, а также от ее исторической ценности и редкости.
2. Стоимость монеты в реальной жизни не зависит от процента драгоценного металла в ее сплаве. Она не изме-

няет стоимость в зависимости от стоимости благородных металлов на рынке.

3. Алхимики с давних пор мечтали превратить простые металлы в золото и серебро. Для этого базовые металлы пытались сплавить и смешать с различными веществами и примесями, при этом произнося заклинания и совершая магические обряды.

4. Хотя вековая мечта алхимиков превратить простой металл в благородный и не сбылась, на пути ее достижения были изучены физические и химические свойства металлов и других веществ, составлены трактаты, которые впоследствии стали основой современной химии.

5. Установление единой неразменной валюты в стране позволяет избежать зависимости стоимости монеты от стоимости металлов в конкретное время.

6. Базовыми металлами считаются железо, никель, свинец, цинк и медь. Они сравнительно недорого стоят и имеют особенность окисляться и корродировать, чего, впрочем, можно избежать за счет применения различных сплавов.

7. Соляная кислота в разбавленном виде легко вступает в реакцию с базовыми металлами, при этом образуется водород.

8. С помощью соляной кислоты можно легко проверить, действительно ли изделие состоит из благородного металла.

9. Благородные металлы всегда ценились выше базовых, потому что не вступают в реакцию в кислороде и водой и не корродируют.

10. В старые времена монеты изготавливались из благородных металлов, что и определяло их стоимость.

11. С изобретением сплавов отпала необходимость применять драгоценные металлы для чеканки монет, поскольку сплав базовых металлов защищен от коррозии и ржавчины.

12. Для того чтобы базовый металл не окислялся и не ржавел от кислорода и влаги, применяют различные химические приемы, древнейший из которых — это сплав.

X. Make up 10 word combinations on the topic in Russian for your fellow-students to translate.

XI. Make up 10 word combinations on the topic English for your fellow-students to translate.

XII. Make up 10 sentences about metals and their chemical and physical properties in Russian for your fellow-students to translate.

XIII. Act out a monologue of the owner of a metallurgical plant in English for your fellow-students to translate into Russian. Speak about your plant and production, metals and their physical and chemical properties.

XIV. Make up a Russian-English dialogue of two scientists who have invented a new alloy. Speak about its production, physical and chemical properties, ways of application. Your fellow-students are supposed to translate it.

XV. Make up Russian-English dialogues for your group-mates to translate:

- Two owners of a metallurgic plant discussing your production, metals as materials and their basic properties;
- a Russian and an English student of the department of chemistry speaking about properties and peculiarities of different metals and the ways of their applying;
- two businessmen who want to start their own metallurgy plant and discuss the perspective production and the ways of its merchandizing;
- two proprietors trading metals and discussing their peculiarities, ways of application.

TEXT E

KINDS OF METALS

I. Read and translate the following text.

Ferrous metal

The term "ferrous" is derived from the latin word meaning "containing iron". This can include pure iron, such as wrought iron, or an alloy such as steel. Ferrous metals are often magnetic, but not exclusively.

Noble metal

Noble metals are metals that are resistant to corrosion or oxidation, unlike most base metals. They tend to be precious metals, often due to perceived rarity. Examples include tantalum, gold, platinum, and rhodium.

Precious metal

A **precious metal** is a rare metallic chemical element of high economic value.

Chemically, the precious metals are less reactive than most elements, have high luster and high electrical conductivity. Historically, precious metals were important as currency, but are now regarded mainly as investment and industrial commodities. Gold, silver, platinum and palladium each have an ISO 4217 currency code. The best-known precious metals are gold and silver. While both have industrial uses, they are better known for their uses in art, jewelry, and coinage. Other precious metals include the platinum group metals: ruthenium, rhodium, palladium, osmium, iridium, and platinum, of which platinum is the most widely traded. Plutonium and uranium could also be considered precious metals.

The demand for precious metals is driven not only by their practical use, but also by their role as investments and a store of value. Palladium was, as of summer 2006, valued at a little under half the price of gold, and platinum at around twice that of gold. Silver is substantially less expensive than these metals,

but is often traditionally considered a precious metal for its role in coinage and jewelry.

Источник: <http://www.wisegeek.com/what-are-ferrous-metals.htm>

II. Write out all the words denoting chemical elements and terms from the text, find their transcriptions and Russian equivalents.

III. Write out all the words denoting physical qualities of metals, look their transcription and translation up in the dictionary.

IV. Translate the following word combinations from English into Russian.

Ferrous, wrought iron, magnetic, exclusively, noble metals, to be resistant to smth, oxidation, rarity, precious metals, tantalum, platinum, rhodium, of high economic value, to be important as currency, to be regarded as investment, industrial commodity, palladium, currency code, industrial use, jewelry, coinage, platinum group, ruthenium, osmium, iridium, to be widely traded, plutonium, uranium, to be valued.

V. Translate the following word combinations from Russian into English.

Цениться, драгоценности, исключительно, промышленное применение, ценные металлы, благородные металлы, железосодержащий, обладающий магнитными свойствами, рутений, платина, платиновая группа, чеканка монет, иридий, устойчивый к, кованое железо, родий, осмий, уран, высокая экономическая ценность, палладий, быть в свободной продаже, окисление, плутоний, считается средством вложения денег, редкость, промышленные товары, тантал, валюта значительной ценности, валютный код.

VI. Explain the following terms using your own words.

Ferrous, currency, investment, economic value, rarity, precious metals, resistant, industrial commodity, magnetic.

VII. Translate from English into Russian.

1. Tantalum is a chemical element which name comes from Tantalus, a hero from Greek mythology. Tantalum is a rare, hard, blue-grey lustrous transition metal which is highly corrosion-resistant.

2. Platinum is a dense, malleable, ductile, highly unreactive, precious, grey-white transition metal.

3. Rhodium is a chemical element which is rare, silvery-white, hard and chemically inert transition metal.

4. Rhodium is a member of the platinum group.

5. Ruthenium is a rare, transition metal belonging to the platinum group of the periodic table.

6. Like the other metals of the platinum group, ruthenium is inert to most other chemicals.

7. Osmium is a hard, brittle, bluish-white transition metal in the platinum group which is found as a trace element in alloys, mostly in alloys, mostly in platinum ores.

8. Osmium alloys are very hard and along with other platinum group metals is almost entirely used in alloys with platinum and iridium.

9. Iridium is very hard, brittle, silvery-white transition metal of the platinum group.

10. Iridium is one of the densest metals.

11. Plutonium is a radioactive chemical element. It is a silvery-grey metal that tarnishes when exposed to air and forms a dull coating when oxidized.

12. Uranium is a silvery-white metal in the actinide series of the periodic table.

VIII. Fill in the gaps.

1. ... metals are usually magnetic.

2. Tantalum, platinum and rhodium are ... metals.

3. Precious metals are ...

4. Precious metals have ...

5. ... metals are not used only in jewelry but in ...

6. Not all the precious metals are ...

7. Some ... are extremely radioactive.

8. Not all the noble metals are ... corrosion.
9. Most alloys are used in ...
10. Most precious metals have ...

IX. Translate the following sentences from Russian into English.

1. Не все благородные металлы можно свободно купить, так как некоторые из них крайне радиоактивны.
2. Некоторые благородные металлы не устойчивы к коррозии.
3. Цена металла обусловлена его редкостью.
4. Ценные металлы не только пригодны для ювелирной промышленности, но и считаются выгодным вложением денег.
5. Большинство металлов имеют высокую экономическую ценность, так как применяются в промышленности и чеканке монет.
6. Металлы платиновой группы очень высоко ценятся, и не все из них находятся в свободной продаже.
7. Большинство железосодержащих металлов имеют магнитные свойства.
8. Для того, чтобы изделие из металла было устойчиво к окислению и коррозии, широко применяются сплавы.

X. Make up 10 word combinations on the topic in Russian for your fellow-students to translate.

XI. Make up 10 word combinations on the topic English for your fellow-students to translate.

XII. Make up 10 sentences about metals and their chemical and physical properties in Russian for your fellow-students to translate.

XIII. Act out a monologue of the owner of a metallurgical plant in English for your fellow-students to translate into Russian. Speak about your plant and production, metals and their physical and chemical properties.

XIV. Make up Russian-English dialogues for your group-mates to translate:

- Two owners of a metallurgic plant discussing your production, metals as materials and their basic properties;
- a Russian and an English student of the department of chemistry speaking about properties and peculiarities of different metals and the ways of their applying;
- two businessmen who want to start their own metallurgy plant and discuss the perspective production and the ways of its merchandizing;
- two proprietors trading metals and discussing their peculiarities, ways of application.

TEXT F

EXTRACTION

I. Read and translate the following text.

Extraction

Metals are often extracted from the Earth by means of mining, resulting in ores that are relatively rich sources of the requisite elements. Ore is located by prospecting techniques, followed by the exploration and examination of deposits. Mineral sources are generally divided into surface mines, which are mined by excavation using heavy equipment, and subsurface mines.

Once the ore is mined, the metals must be extracted, usually by chemical or electrolytic reduction. Pyrometallurgy uses high temperatures to convert ore into raw metals, while hydrometallurgy employs aqueous chemistry for the same purpose. The methods used depend on the metal and their contaminants.

Источник: <http://schools-wikipedia.org/wp/m/Metal.htm>

II. Write out all the words denoting chemical elements and terms from the text, find their transcriptions and Russian equivalents.

III. Write out all the words denoting physical qualities of metals, look their transcription and translation up in the dictionary.

IV. Translate and transcribe the following words and expressions.

Extraction, to be extracted from the Earth, mining, ores, rich sources, requisite elements, prospecting techniques, exploration, examination of deposits, mineral sources, surface mines, excavation, heavy equipment, subsurface mines, chemical reduction, electrolytic reduction, pyrometallurgy, hydrometallurgy, to employ, aqueous chemistry, a contaminant.

V. Translate the following words and expressions from Russian into English.

Примесь, водная химия, добыча, задействовать, добываться из земли, гидрометаллургия, добыча из шахты, преобразовывать руду в сырье, богатые залежи, сырьевые ресурсы, необходимые элементы, пирометаллургия, перспективные методы, электролитическое снижение, геологоразведка, химическое снижение, обследование месторождений, подземные шахты, минеральные ресурсы, тяжелая техника, карьеры, раскопки.

VI. Explain the following terms using your own words.

Extraction, aqueous chemistry, excavation, hydrometallurgy, pyrometallurgy, chemical reduction, surface mines, a contaminant, mining, mineral sources, subsurface mines, ores, requisite elements.

VII. Translate from English into Russian.

1. Mining is the extraction of valuable minerals or other geological materials from the Earth.

2. An ore is a type of rock that contains sufficient minerals with important elements including metals that can be economically extracted from the rock.

3. Surface mining is a method which operates on the surface of the land.

4. Surface mining includes strip mining, open-pit mining and mountaintop removal mining.

5. Subsurface or underground mining refers to various underground mining techniques used to excavate hard minerals, mainly those containing metals such as containing gold, silver, iron, copper, zinc, nickel, tin and lead.

6. Reduction is any chemical reaction that involves the gaining of electrons.

7. When iron reacts with oxygen it forms a chemical called rust. In that example, the iron is oxidized and the oxygen is reduced. Reduction is the opposite of oxidation.

8. A reduction reaction always comes together with an oxidation reaction. Oxidation and reduction together are called redox.

9. Pyrometallurgy is a branch of extractive metallurgy. It consists of the thermal treatment of minerals and metallurgical ores and concentrates to bring about physical and chemical transformations in the materials to enable recovery of valuable materials.

10. Hydrometallurgy is a method for obtaining metals from their ores.

11. An aqueous solution is a solution in which the solvent is water.

12. Contamination is the presence of a minor and unwanted constituent in a material. This constituent is called contaminant.

VIII. Fill in the gaps.

1. Ores contain a lot of ... To get pure metals from ores it is necessary to get rid of ...

2. ... is a branch of metallurgy that is based on aqueous chemistry.

3. ... is a branch of metallurgy that is based on thermal treatment of minerals.

4. To extract ores from the earth one should use ... and ...

5. ... is necessary to know what ore is possible to extract from a particular place.
6. ... is converted into ...
7. A ... is a substance which is present in the ore and must be got rid of.
8. ... are deep holes in the earth.
9. ... are open-pit mines.
10. There are ... of minerals in particular areas.

IX. Translate the following sentences from Russian into English.

1. В России богатые залежи железной руды.
2. Для добычи руды используют различную тяжелую технику.
3. Руду добывают в карьерах и подземных шахтах.
4. Для определения местонахождения руд применяют геологоразведку и обследование месторождений.
5. Раскопки проводятся с помощью тяжелой техники.
6. Для преобразования руды в сырье применяют различные химические реакции.
7. Электролитическое и химическое восстановление — сложные химические процессы, применяемые для преобразования руды в сырой материал.
8. Для добычи руды применяются различные перспективные методы.
9. В результате обследования месторождения выяснилось, что в области находятся большие залежи железной руды.
10. Для работы в карьере и раскопок применяют тяжелую технику.

X. Make up 10 word combinations on the topic in Russian for your fellow-students to translate.

XI. Make up 10 word combinations on the topic English for your fellow-students to translate.

XII. Make up 10 sentences about metals and their chemical and physical properties in Russian for your fellow-students to translate.

XIII. Act out a monologue of the owner of a metallurgical plant in English for your fellow-students to translate into Russian. Speak about your plant and production, metals and their physical and chemical properties.

XIV. Make up Russian-English dialogues for your group-mates to translate:

- Two owners of a metallurgic plant discussing your production, metals as materials and their basic properties;

- a Russian and an English student of the department of chemistry speaking about properties and peculiarities of different metals and the ways of their applying;

- two businessmen who want to start their own metallurgy plant and discuss the perspective production and the ways of its merchandizing;

- two proprietors trading metals and discussing their peculiarities, ways of application.

TEXT G

APPLICATIONS

I. Read and translate the following text.

Some metals and metal alloys possess high structural strength per unit mass, making them useful materials for carrying large loads or resisting impact damage. Metal alloys can be engineered to have high resistance to shear, torque and deformation. However the same metal can also be vulnerable to fatigue damage through repeated use, or from sudden stress failure when a load capacity is exceeded. The strength and resilience of metals has led to their frequent use in high-rise building and bridge construction, as well

as most vehicles, many appliances, tools, pipes, non-illuminated signs and railroad tracks.

Metals are good conductors, making them valuable in electrical appliances and for carrying an electric current over a distance with little energy lost. Electrical power grids rely on metal cables to distribute electricity. Home electrical systems, for the most part, are wired with copper wire for its good conducting properties.

The thermal conductivity of metal is useful for containers to heat materials over a flame. Metal is also used for heat sinks to protect sensitive equipment from overheating.

The high reflectivity of some metals is important in the construction of mirrors, including precision astronomical instruments. This last property can also make metallic jewelry aesthetically appealing.

Some metals have specialized uses; Radioactive metals such as Uranium and Plutonium are used in nuclear power plants to produce energy via nuclear fission. Mercury is a liquid at room temperature and is used in switches to complete a circuit when it flows over the switch contacts. Shape memory alloy is used for applications such as pipes, fasteners and vascular stents. However they are very good at conducting electricity and heat.

Источник: <http://schools-wikipedia.org/wp/m/Metal.htm>

II. Write out all the words denoting chemical elements and terms from the text, find their transcriptions and Russian equivalents.

III. Write out all the words denoting physical qualities of metals, look their transcription and translation up in the dictionary.

IV. Translate and transcribe the following words and expressions.

Metal alloy, high structural strength per unit mass, to carry large loads, to resist impact damage, to have high resistance to smth, shear, torque, deformation, to be vulnerable to fatigue, damage through repeated use, sudden stress failure, to exceed load capacity, resistance of metals, frequent use, high-rise buildings, bridge construction, vehicles, appliance, tools, pipes, non-illuminated signs, railroad tracks, a good constructor, electrical appliances, to carry an electric current, with a little energy lost, metal grid, to distribute electricity, copper wire, good conductivity properties, to heat materials over a flame, heat sinks, to protect sensitive equipment, overheating, high reflectivity, construction of mirrors, precision astronomical instruments, aesthetically appealing, nuclear power plants, to produce energy via nuclear fission, mercury, liquid at room temperature, switch, to complete a circuit, to flow over the switch contacts, shape memory alloys, fasteners, vascular stents.

V. Translate the following words and expressions from Russian into English.

Сплавы с памятью формы, ртуть/ртутный, сосудистые стенты, атомные электростанции, замыкать цепь, производить энергию за счет деления ядра, жидкий при комнатной температуре, зажимы/застежки, выключатель/коммутатор, течь через контакты переключателя, металлический сплав, инструменты, трубы, эстетически привлекательный, конструирование мостов, высокая структурная прочность на единицу массы, частое использование, точные астрономические инструменты, электрическое оборудование, противостоять ударным повреждениям, световые вывески, повышать грузоподъемность, переносить большие нагрузки, радиаторы, железные дороги, деформация, иметь высокую сопротивляемость к, с малой потерей энергии, проводить электроток, перегрев, транспортные средства, сопротивляемость металлов, скручивание, защищать чувствительное оборудование, изготовление зеркал, быть подверженным усталости, разрыв, высотное здание, внезапный усталостный излом, оборудование, повреждение за счет повторного

использования, хорошие проводящие свойства, высокая отражательная способность, изготавливать металлическую сетку, распределять электроэнергию, медная проволока, нагревать материалы над пламенем.

VI. Explain the following terms using your own words.

Metal alloy, to carry large loads, precision astronomical instruments to resist impact damage, to have high resistance to smth, to protect sensitive equipment,, to be vulnerable to fatigue, to exceed load capacity, resistance of metals, frequent use, high-rise buildings, bridge construction, vehicles, appliance, tools, pipes, non-illuminated signs, railroad tracks, a good constructor, electrical appliances, to carry an electric current, with a little energy lost, metal grid, damage through repeated use, sudden stress failure, to distribute electricity, copper wire, good conductivity properties, to heat materials over a flame, heat sinks, overheating, high structural strength per unit mass, shear, torque, deformation, high reflectivity, construction of mirrors, , aesthetically appealing, nuclear power plants, to produce energy via nuclear fission, liquid at room temperature, switch, to complete a circuit, to flow over the switch contacts, shape memory alloys, fasteners, vascular stents.

VII. Translate from English into Russian.

1. Mercury is a chemical element which is commonly known as quicksilver and was formerly named hydrargyrum. Mercury is the only metallic element that is liquid at standard conditions for temperature and pressure.

2. Mercury is used in thermometers, barometers, manometers, fluorescent lamps and other devices.

3. As mercury is a very toxic element now there are alcohol- or galinstan-filled glass thermometers produced.

4. A nuclear power plant is a thermal power station in which the heat source is a nuclear reaction.

5. In materials science, fatigue is the weakening of a material caused by repeatedly applied loads.

6. The failure of a material is usually classified into brittle failure or ductile failure.

7. Failure theory is a science of predicting the conditions under which solid materials fail under the action of external loads.

8. Torque is the tendency of a force to rotate an object about an axis.

9. In nuclear physics and nuclear chemistry, nuclear fission is either a nuclear reaction or a radioactive decay process in which the nucleus of an atom splits into smaller parts (lighter nuclei).

10. A shape-memory alloy is an alloy that “remembers” its original shape and that when deformed returns to its pre-deformed shape when heated.

VIII. Fill in the gaps.

1. Some alloys have ... and that's why are not vulnerable to impact, shear, torque and deformation damage.

2. There are ..., ..., ... and damage.

3. Some alloys are resistant to...

4. Alloys that have high resistance are used in ...

5. Metals have ... and carry electric current.

6. Metal grids are made from ...

7. ... is liquid at room temperature.

8. ... are plants that ... fission.

9. ... are alloys that “remember” the pre-deformed shape.

10. ... is a very toxic substance.

IX. Translate from Russian into English.

1. Есть вещества, которые находятся в жидком состоянии при комнатной температуре. Как правило, металлы при комнатной температуре твердые. Исключением является ртуть.

2. Использование ртути для производства бытовых термометров и барометров крайне рискованно, поскольку стеклянные термометры очень хрупкие и токсичная ртуть может легко вылиться наружу.

3. В XX веке энергетический кризис был решен за счет строительства атомных электростанций, которые производят электроэнергию за счет ядерного расщепления. Однако такие электростанции представляют собой значительную экологическую угрозу.

4. Сплавы как метод производства металлических изделий имеют огромный потенциал для придания металлам новых физических свойств. В настоящее время известен ряд сплавов со свойствами памяти формы, высокой ударостойкостью и высокой стойкостью к усталостному излому.

5. Высокопрочные сплавы применяются при строительстве мостов, высотных строений, оборудования и транспортных средств.

6. Существуют металлические сплавы с высокой структурной прочностью на единицу массы, способные нести большие нагрузки.

7. Металлы обладают большой электропроводностью и способны проводить электрический ток.

8. Металлы используются для производства зеркал с высокой отражательной способностью.

9. Металлы применяются для производства высокоточного оборудования, например астрономических инструментов.

X. Using the words and expressions from the texts make up a report about kinds of metals for your fellow-students to translate from English into Russian.

XI. Using the words and expressions from the texts make up a report about the production of stainless steel for your fellow-students to translate from English into Russian.

XII. Using the words and expressions from the texts make up a report about Damask steel and the traditions of its creation for your fellow-students to translate from English into Russian.

XIII. Make up 10 word combinations on the topic in Russian for your fellow-students to translate.

XIV. Make up 10 word combinations on the topic English for your fellow-students to translate.

XV. Make up 10 sentences about metals and their chemical and physical properties in Russian for your fellow-students to translate.

XVI. Act out a monologue of the owner of a metallurgical plant in English for your fellow-students to translate into Russian. Speak about your plant and production, metals and their physical and chemical properties.

XVII. Make up Russian-English dialogues for your group-mates to translate:

- Two owners of a metallurgic plant discussing your production, metals as materials and their basic properties;
- a Russian and an English student of the department of chemistry speaking about properties and peculiarities of different metals and the ways of their applying;
- two businessmen who want to start their own metallurgy plant and discuss the perspective production and the ways of its merchandizing;
- two proprietors trading metals and discussing their peculiarities, ways of application.

TEXT H

METALWORKING

I. Read and translate the following text.

Metalworking is the process of working with metals to create individual parts, assemblies, or large scale structures. The term covers a wide range of work from large ships and bridges to

precise engine parts and delicate jewellery. It therefore includes a correspondingly wide range of skills, processes, and tools.

Metalworking is a science, art, hobby, industry and trade. Its historical roots span cultures, civilizations, and millennia. Metalworking has evolved from the discovery of smelting various ores, producing malleable and ductile metal useful for tools and adornments. Modern metalworking processes, though diverse and specialized, can be categorized as forming, cutting or joining processes. Today's machine shop includes a number of machine tools capable of creating a precise, useful workpiece.

Metalworking predates history. No one knows with any certainty where or when metalworking began. The earliest technologies were impermanent to say the least and were unlikely to leave any evidence for long. The advance that brought metal into focus was the connection of fire and metals. Who accomplished this is as unknown as the when and where, but the Egyptians are thought to have been one of the first civilizations to work gold.

Not all metal required fire to obtain it or work it. Isaac Asimov speculated that gold was the "first metal." His reasoning is that gold by its chemistry is found in nature as nuggets of pure gold. In other words, gold, as rare as it is, is always found in nature as the metal that it is. There are a few other metals that sometimes occur natively, and as a result of meteors. Almost all other metals are found in ores, a mineral bearing rock, that require heat or some other process to liberate the metal. Another feature of gold is that it is workable as it is found, meaning that no technology beyond eyes to find a nugget and a hammer and an anvil to work the metal is needed. Stone hammer and stone anvil will suffice for technology. This is the result of gold's properties of malleability and ductility. The earliest tools were stone, bone, wood, and sinew. They sufficed to work gold.

At some unknown point the connection between heat and the liberation of metals from rock became clear, rocks rich in copper, tin, and lead came into demand. These ores were mined

wherever they were recognized. Remnants of such ancient mines have been found all over what is today the Middle East. Metalworking was being carried out by the South Asian inhabitants of Mehrgarh between 7000—3300 BCE. The end of the beginning of metalworking occurs sometime around 6000 BCE when copper smelting became common in the Middle East.

The ancients knew of seven metals. Here they are arranged in order of their oxidation potential:

- Iron +0.44,
- Tin +0.14
- Lead +0.13
- Copper -0.34
- Mercury -0.79
- Silver -0.80
- Gold -1.50

The oxidation potential is important because it is one indicator of how tightly bound to the ore the metal is likely to be. As can be seen, iron is significantly higher than the other six metals while gold is dramatically lower than the six above it. Gold's low oxidation is one of the main reasons that gold is found in nuggets. These nuggets are relatively pure gold and are workable as they are found.

Copper ore, being relatively abundant, and tin ore became the next important players in the story of metalworking. Using heat to smelt copper from ore, a great deal of copper was produced. It was used for both jewelry and simple tools. However, copper by itself was too soft for tools requiring edges and stiffness. At some point tin was added into the molten copper and bronze was born. Bronze is an alloy of copper and tin. Bronze was an important advance because it had the edge-durability and stiffness that pure copper lacked. Until the advent of iron, bronze was the most advanced metal for tools and weapons in common use.

Looking beyond the Middle East, these same advances and materials were being discovered and used the world around.

China and Britain jumped into the use of bronze with little time being devoted to copper. Japan began the use of bronze and iron almost simultaneously. In the Americas things were different. Although the peoples of the Americas knew of metals, it wasn't until the arrival of Europeans that metal for tools and weapons took off. Jewelry and art were the principal uses of metals in the Americas prior to European influence.

Around the date 2700 BCE, production of bronze was common in locales where the necessary materials could be assembled for smelting, heating, and working the metal. Iron was beginning to be smelted. Iron began its emergence as an important metal for tools and weapons.

Источник: <https://en.wikipedia.org/wiki/Metalworking>

II. Write out all the words denoting chemical elements and terms from the text, find their transcriptions and Russian equivalents.

III. Write out all the words denoting physical qualities of metals, look their transcription and translation up in the dictionary.

IV. Translate and transcribe the following words and expressions.

To cover a wide range of work, precise engine parts, large scale structures, delicate jewelry, wide range of skills, the discovery of smelting various ores, adornments, forming, cutting, joining, precise, nuggets of pure gold, to liberate the metal, anvil, malleability, ductility, remnants, oxidation potential, relatively abundant, to smelt copper from ore, molten copper, alloy, advent, tools, weapons, simultaneously, prior, production of bronze, a locate, emergence.

V. Translate the following words and expressions from Russian into English.

Возникновение, присоединение, точный, сплав, инструменты, одновременно, оружие, раскопки, производство

бронзы, точные части двигателей, слитки чистого золота, выделить металл из руды, плавить медь из руды, расплавленная медь, выход, вязкость, окислительный потенциал, крупномасштабные структуры, изобретение способов выплавки руды, широкий диапазон умений, украшения, формование, наковальня, относительно большой, месторождение.

VI. Explain the following terms using your own words.

Ductility, remnants, oxidation potential, alloy, advent, precise engine parts, nuggets of pure gold, tools, weapons, relatively abundant, to smelt copper from ore, a locate, anvil, malleability, emergence, molten copper, large scale parts.

VII. Translate from English into Russian.

1. Relatively abundant locates of copper ore are found in many places in Russia.

2. Production of bronze started relatively early. It was largely used for production of weapons, tools and delicate jewelry.

3. The discovery of smelting various ores changes the lives of ancient tribes completely. People smelted copper from ores and worked it using anvils and hammers.

4. Remnants of relatively abundant locates of metal ores show the location of more or less civilized peoples' tribes.

5. Copper can be characterized as an easily malleable metal, that's why the majority of ancient tools and weapons are produced using it.

6. Pure copper is too soft for producing stiff tools and parts, so ancient people used bronze to produce tools and weapons.

7. Ancient people smelted copper from ores using heat.

8. Bronze is an alloy of copper and tin. In this alloy both metals get new physical properties.

9. Tools and delicate jewelry were produced ahead of weapons in both Americas.

10. Gold in nuggets is relatively pure.

VIII. Fill in the gaps.

1. An ancient civilization is defined to be in the Bronze Age either by smelting its own ... and alloying with
2. Human-made ... technology requires set production techniques.
3. ... nuggets are high purity as they form very near the surface, and the ironstone erodes out of them.
4. ... is the process of working with metals to create individual parts, assemblies, or large scale structures.
5. The term covers ... from large ships and bridges to precise engine parts and delicate It therefore includes a correspondingly wide range of skills, processes, and tools.
6. ... is a measure of the tendency of a chemical species to acquire electrons and thereby be reduced.
7. is a science, art, hobby, industry and trade.
8. Its historical roots span cultures, civilizations, and millennia. Metalworking has evolved from the discovery of ..., producing malleable and ductile metal useful for tools and adornments.
9. Modern metalworking processes, though diverse and specialized, can be categorized as ..., cutting or joining processes. Today's machine shop includes a number of machine tools capable of creating a precise, useful workpiece.
10. ... is an iron block on which metal is placed to be shaped, originally by hand with a
11. The blacksmith's ... is usually of wrought iron, but sometimes of cast iron, with a smooth working surface of hardened steel.

IX. Translate from Russian into English.

1. Самый первый и древний способ изготовления орудий труда, оружия и украшений — это отливка меди в каменных связанных между собой формах.
2. С развитием умений и технологий человечество перешло к обработке металлов с помощью молота и наковальни.

3. Поскольку медь представляет собой сравнительно мягкий и податливый металл, те части и орудия труда, которые требовали прочности и остроты, изготавливались из бронзы, которая является сплавом меди и олова.

4. Когда человек понял, что, применяя высокие температуры, можно освобождать медь и другие металлы из горной породы, началось развитие способов и технологий обработки металлов, которые в дальнейшем легли в основу тяжелой металлургии.

5. Изучая свойства руд и выплавляемых из них металлов, человечество создавало все больше сплавов, придавая с их помощью изделиям необходимые свойства и характеристики.

6. Как известно, не все технологии обработки металлов требуют повышенной температуры и физического воздействия.

X. Using the words and expressions from the texts make up a report about The Iron Age for your fellow-students to translate from English into Russian.

XI. Using the words and expressions from the texts make up a report about the Bronze Age for your fellow-students to translate from English into Russian.

XII. Make up 10 word combinations on the topic in Russian for your fellow-students to translate.

XIII. Make up 10 word combinations on the topic English for your fellow-students to translate.

XIV. Make up 10 sentences about metals and their chemical and physical properties in Russian for your fellow-students to translate.

XV. Act out a monologue of the owner of a metallurgical plant in English for your fellow-students to translate into Russian. Speak about your plant and production, metals and their physical and chemical properties.

VI. Make up Russian-English dialogues for your group-mates to translate:

- Two owners of a metallurgic plant discussing your production, metals as materials and their basic properties;
- a Russian and an English student of the department of chemistry speaking about properties and peculiarities of different metals and the ways of their applying;
- two businessmen who want to start their own metallurgy plant and discuss the perspective production and the ways of its merchandizing;
- two proprietors trading metals and discussing their peculiarities, ways of application.

REVISION

I. Read and translate the following sentences.

A crystalline structure ['krɪstəlaɪn]

Irregular crystals

Grains

The size/the shape/ orientation / composition of the grains

Small/coarse grains

Heat treatment

Quenching ['kwentʃɪŋ] — закалка

Tempering — отпуск после закалки, нормализация

Annealing [ə'ni:lɪŋ] — отжиг, прокаливание

Pure metal

Alloying ['æloɪɪŋ] — сплав, сплавление

To change the grain structure

To be formed by drawing/rolling/hammering/extrusion

To be subject to metal fatigue

Creep — крип, ползучесть металла

To cause deformation/failure

To take smth into account
High-temperature chemical processes
Machine-tools
Lathe [лeтѠ] — токарный станок
Milling machines
Shaper — строгальный станок
Grinder — шлифовальный станок
To be melted
To be cast in molds
To react with air

II. Translate from English into Russian.

1. Quenching of metals is usually produced by a quick change of temperature from high to low.
2. Heat treatment is necessary to change the shape of a metal article.
3. Any metal is subject to metal fatigue.
4. Working with metal usually includes high-temperature chemical processes.
5. One kind of shaping metals is casting in molds.
6. For shaping articles of metal shapers and grinders are used.
7. Producers should take into account not only the kind of metal, the size, shape, orientation and composition of the grains but also the reaction of the metal with air.
8. Lathes, shapers and grinders are machine-tools.
9. Pure metals are subject to deformation and fracturing that's why alloying of metals is widely used in metallurgy.
10. Changing the shape of the metal includes heat treatment, drawing, rolling, hammering and extrusion.
11. Wires are produced with the help of extrusion.
12. Pipes are produced with the help of rolling.

III. Fill in the gaps.

1. The ..., ..., ..., ... of the grains of metal is a very important thing which should be ...
2. ... includes annealing and tempering.

3. ... is different in different metals. There can be ... and ... crystals.
4. Any metal is ...
5. Machine tools are ..., ..., ..., ...
6. To avoid fracture and deformation of products ... is used.
7. Wires are produced with the help of ...
8. All the chemical processes connected with producing metals are ...
9. In old times smiths used ... to produce metal articles of different shapes.
10. After quenching there comes...
11. There are .. and ... grains.
12. It is quite possible to ... the grain ...

IV. Translate from Russian into English.

Производство металла — это сложный технологический процесс. Как правило, он включает в себя различные химические процессы, протекающие при нагревании. С древних времен человечество применяет прием накаливания металла для придания ему нужной формы. В старые времена кузнецы накаливали куски металла докрасна и придавали ему форму с помощью молотка. Сейчас применяется не только обработка молотом, но и такие процессы, как прокат и экструзия.

Как правило, после придания изделию формы проводят процесс закалки и нормализации. Они необходимы для того, чтобы изделие было прочным и для предотвращения хрупкости.

Давно известно, что изделия из чистого металла сильно подвержены износу, деформации и поломке. Поэтому уже давно используют не чистые металлы, а сплавы, которые получают путем смешивания разных металлов при высокой температуре и давлении.

Для обработки металла используют такие станки, как токарные, строгальные и шлифовальные.

V. Make up 10 word combinations on the topic in Russian for your fellow-students to translate.

VI. Make up 10 word combinations on the topic English for your fellow-students to translate.

VII. Make up 10 sentences about metals and their chemical and physical properties in Russian for your fellow-students to translate.

VIII. Act out a monologue of the owner of a metallurgical plant in English for your fellow-students to translate into Russian. Speak about your plant and production, metals and their physical and chemical properties.

IX. Make up Russian-English dialogues for your group-mates to translate:

- Two owners of a metallurgic plant discussing your production, metals as materials and their basic properties;
- a Russian and an English student of the department of chemistry speaking about properties and peculiarities of different metals and the ways of their applying;
- two businessmen who want to start their own metallurgy plant and discuss the perspective production and the ways of its merchandizing;
- two proprietors trading metals and discussing their peculiarities, ways of application.

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