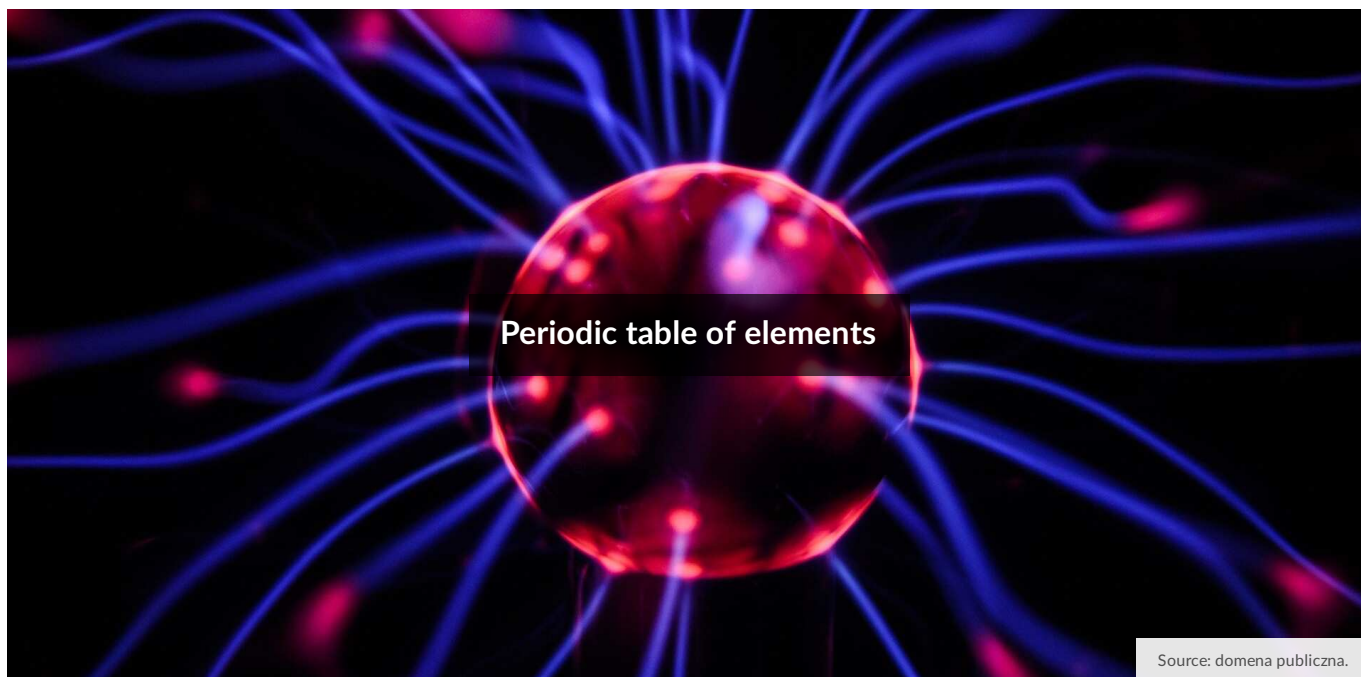




Periodic table of elements

- [Periodic table of elements](#)
- [Lesson plan \(Polish\)](#)
- [Lesson plan \(English\)](#)



[Link to the lesson](#)

Before you start you should know

- that the basic component of matter is an atom;
- what is the atomic number;
- what is the atomic mass;
- what are the symbols and names of elements;
- that the elements are divided into metals and non-metals.

You will learn

- interpret periodic law;
- describe the structure of the periodic table (indicate groups and periods);
- determine the location of the element in the periodic table;
- indicate metals and non-metals in the periodic table;
- check information about the element (atomic number, atomic mass, type of element) from the periodic table basic information about the element.

[Nagranie dostępne na portalu epodreczniki.pl](#)

Nagranie dźwiękowe abstraktu.

How were the elements classified?

The nineteenth century was the time when scientists already knew several dozens of chemical elements. These were examined and described by them. Scientists at the time noticed that among the elements there are those that exhibit similar properties. They were looking for a key according to which they could organize and classify them.

Task 1

Using the Internet, a textbook and e-textbook, find information on the history of classification of elements. Answer the questions:

- Who - name scientists - made attempts to classify elements?
- What common features did the scientists notice?
- Who formulated the periodic law?

Scholars who made attempts to classify elements

Common features of elements

The periodical law was established by...

How is the periodic table of elements built?

Periodic table of elements is a table listing of all chemical elements ordered by increasing atomic number. The elements are grouped according to cyclically similar properties. Columns are called groups, and rows are called periods. Groups and periods are numbered.

All groups have been given names that come from the names of the elements at the beginning of the group. Elements belonging to the same group have similar properties. The exception is hydrogen. Although it is located in a group of alkali metals, because of its properties it does not belong to any of the groups.

Task 2

Consider the minimum number of parameters that should be given to determine the location of the element in the periodic table? In how many ways can you describe the location of the element in this table?

What shapes can periodic table have?

Some scientists have developed periodic tables with different shapes. However, the method of presenting elements in the form of a table is the most commonly used. It has also been approved by The International Union of Pure and Applied Chemistry, abbreviation **IUPAC** – organization dealing, inter alia, with the standardization of symbols, nomenclature and patterns used by chemists around the world.

IUPAC Periodic Table of the Elements

1 H Hydrogen 1.00794																	18 He Helium 4.002602
2 Li Lithium 6.941	3 Be Beryllium 9.012182											13 B Boron 10.811	14 C Carbon 12.011	15 N Nitrogen 14.007	16 O Oxygen 15.999	17 F Fluorine 18.998	19 Ne Neon 20.180
4 Na Sodium 22.990	5 Mg Magnesium 24.305											11 Al Aluminum 26.982	12 Si Silicon 28.086	14 P Phosphorus 30.974	15 S Sulfur 32.06	16 Cl Chlorine 35.45	18 Ar Argon 39.948
6 K Potassium 39.098	7 Ca Calcium 40.078	8 Sc Scandium 44.956	9 Ti Titanium 47.88	10 V Vanadium 50.942	11 Cr Chromium 52.004	12 Mn Manganese 54.938	13 Fe Iron 55.845	14 Co Cobalt 58.933	15 Ni Nickel 58.69	16 Cu Copper 63.546	17 Zn Zinc 65.38	18 Ga Gallium 69.723	19 Ge Germanium 72.63	20 As Arsenic 74.922	21 Se Selenium 78.96	22 Br Bromine 79.904	23 Kr Krypton 83.80
24 Rb Rubidium 85.468	25 Sr Strontium 87.62	26 Y Yttrium 88.906	27 Zr Zirconium 91.224	28 Nb Niobium 92.906	29 Mo Molybdenum 95.94	30 Tc Technetium [98]	31 Ru Ruthenium 101.07	32 Rh Rhodium 102.91	33 Pd Palladium 106.36	34 Ag Silver 107.868	35 Cd Cadmium 112.411	36 In Indium 114.818	37 Sn Tin 118.710	38 Sb Antimony 121.757	39 Te Tellurium 127.6	40 I Iodine 126.905	41 Xe Xenon 131.29
36 Cs Cesium 132.905	37 Ba Barium 137.327	38 La Lanthanum [138.905]	39 Hf Hafnium 178.49	40 Ta Tantalum 180.948	41 W Tungsten 183.84	42 Re Rhenium 186.207	43 Os Osmium 190.23	44 Ir Iridium 192.222	45 Pt Platinum 195.084	46 Au Gold 196.967	47 Hg Mercury 200.59	48 Tl Thallium 204.383	49 Pb Lead 207.2	50 Bi Bismuth 208.98	51 Po Polonium [209]	52 At Astatine [210]	53 Rn Radon [222]
54 Fr Francium [223]	55 Ra Radium [226]	56 Ac Actinium [227]	57 Rf Rutherfordium [261]	58 Db Dubnium [262]	59 Sg Seaborgium [266]	60 Bh Bohrium [264]	61 Hs Hassium [277]	62 Mt Meitnerium [268]	63 Ds Darmstadtium [285]	64 Rg Roentgenium [281]	65 Cn Copernicium [285]	66 Nh Nihonium [284]	67 Fl Flerovium [289]	68 Mc Moscovium [288]	69 Lv Livermorium [293]	70 Ts Tennessine [289]	71 Og Oganesson [294]

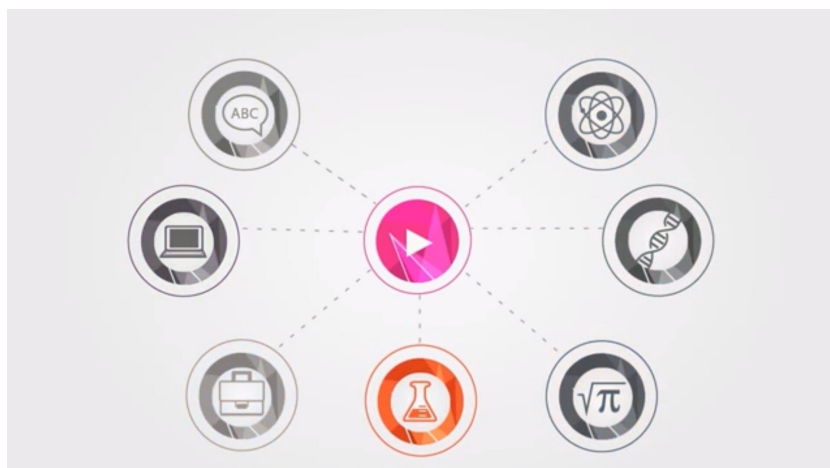
INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY

For notes and updates to this table, see www.iupac.org. This version is dated 28 November 2016. Copyright © 2016 IUPAC, the International Union of Pure and Applied Chemistry.

IUPAC Periodic Table of Elements

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The simplest version of the periodic table contains numbered symbols of chemical elements, group numbers and periods. However, there are also such versions that present other additional information (e.g. names of elements and their properties, structure of their atoms, size of atoms, etc.). Regardless of how much information about elements are contained in periodic table, the order of elements, the number of groups, the type of elements in the group and period are identical in each periodic table of elements.



Film dostępny na portalu epodreczniki.pl

Source: www.fuseschool.org, licencja: CC BY-NC 3.0.

The periodic table consists of 7 rows called Periods, going across, and 18 columns, called Groups going down. The elements in the Periodic Table are arranged according to their atomic number, which is the number of protons in their nucleus. The Period shows the element's electron shell that is being filled. For example sodium is in Period 3 and Group 1. So it has electronic configuration 2:8:1. Whereas chlorine which is also in Period 3 but Group 17 has electronic configuration 2:8:7. So in both cases it is the third shell that is being filled. The group an element is in gives the number of electrons in the outer shell of an atom of that element. Chemical reactions are to do with movement of electrons. So, as all elements in a particular group have the same number of outer shell electrons they have similar chemical reactions. There are trends in properties across Periods. As you look at the elements across the periodic table, from left to right across a period, the elements change from metals to non-metals. There is also a decrease in atomic radius. This is because more protons in the nucleus pull the electrons in. Going from left to right there is an increase in the ionisation energy, that is the energy needed to remove the outermost electron. There is also an increase in electronegativity, which means the attraction of a bonded atom for the pair of electrons in a covalent bond. There are also trends in properties as you move down a Group. As you go down a group, the elements become more metallic. This is seen clearly in group 14 where carbon in period 2 is a non-metal and lead in period 6 is a metal. Going down a group, there is also an increase in atomic radius, which means that an extra shell of electrons is added for each successive element. There are three groups that are usually studied: group 1 called the alkali metals, group 7 called the halogens, and group 18 called the noble gases. As we go down the group 1, the metals become more reactive as metals react by losing electrons and it is easier to lose the outer shell electron the further it is from the positive nucleus. As we go down the group 17, the non-metals become less reactive as non-metals react by gaining electrons and the fewer shells the greater attraction for the incoming electron. Group 18 elements have a full outer shell of electrons and so are very unreactive. Their densities and boiling points increase on going down the group.

Exercise 1

Indicate which of the elements is more chemically active:

sodium <input type="radio"/>	potassium <input type="radio"/>
potassium <input type="radio"/>	calcium <input type="radio"/>
chlorine <input type="radio"/>	bromine <input type="radio"/>
oxygen <input type="radio"/>	fluorine <input type="radio"/>

Exercise 2

Organize the symbols of elements by adding them to appropriate groups according to increasing atomic mass.

ALKALI METALS:

K	Fr	Mg	Si	Sr	Be	C	Ba	Ge
Pb	Li	Sn	Ca	Na				

ALKALINE EARTH METALS:

CARBON GROUP:

Task 3

Mark the division between metals and non-metals on the periodic table of elements (blue). Circle a group of noble gases (yellow) and 5 period (green). Compare your solution with other students.

1 H Hydrogen 1.008																	2 He Helium 4.003	
3 Li Lithium 6.94	4 Be Beryllium 9.012											5 B Boron 10.81	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.998	10 Ne Neon 20.180	
11 Na Sodium 22.990	12 Mg Magnesium 24.305											13 Al Aluminum 26.982	14 Si Silicon 28.085	15 P Phosphorus 30.974	16 S Sulfur 32.06	17 Cl Chlorine 35.45	18 Ar Argon 39.948	
19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 Ti Titanium 47.867	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.845	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.723	32 Ge Germanium 72.630	33 As Arsenic 74.922	34 Se Selenium 78.97	35 Br Bromine 79.904	36 Kr Krypton 83.798	
37 Rb Rubidium 85.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.95	43 Tc Technetium 97.907	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.906	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.414	49 In Indium 114.818	50 Sn Tin 118.710	51 Sb Antimony 121.757	52 Te Tellurium 127.6	53 I Iodine 126.905	54 Xe Xenon 131.29	
55 Cs Cesium 132.905	56 Ba Barium 137.327	* 57 - 70	71 Lu Lutetium 174.967	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.84	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.222	78 Pt Platinum 195.084	79 Au Gold 196.967	80 Hg Mercury 200.592	81 Tl Thallium 204.38	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium [209]	85 At Astatine [210]	86 Rn Radon [222]
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*Lanthanide series		57 La Lanthanum 138.905	58 Ce Cerium 140.116	59 Pr Praseodymium 140.908	60 Nd Neodymium 144.242	61 Pm Promethium [145]	62 Sm Samarium 150.36	63 Eu Europium 151.964	64 Gd Gadolinium 157.25	65 Tb Terbium 158.925	66 Dy Dysprosium 162.500	67 Ho Holmium 164.930	68 Er Erbium 167.256	69 Tm Thulium 168.934	70 Yb Ytterbium 173.046			
**Actinide series		89 Ac Actinium [227]	90 Th Thorium 232.038	91 Pa Protactinium 231.036	92 U Uranium 238.029	93 Np Neptunium [237]	94 Pu Plutonium [244]	95 Am Americium [243]	96 Cm Curium [247]	97 Bk Berkelium [247]	98 Cf Californium [251]	99 Es Einsteinium [252]	100 Fm Fermium [257]	101 Md Mendelevium [258]	102 No Nobelium [259]			

Exercise 3

Which answer is correct. Calcium:

- is located in the second period and the fourth group, has two electron shells and two valence electrons
- it is located in the fourth period and the second group, has four electron shells and four valence electrons
- is located in the fourth period and the second group, has two electron shells and two valence electrons
- it is located in the fourth period and the second group, has four electron shells and two valence electrons

Summary

- Periodic table of elements is a universal way of presentation of chemical elements.
- In the periodic table, the elements (their symbols) are placed sequentially in the table according to the growing atomic number.
- Vertical columns are called groups and horizontal rows – periods. All groups and periods are numbered.
- Elements belonging to one group have similar properties (except for hydrogen).

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Homework

Task 4.1

Find following elements in the periodic table:

- element from the helium group used to fill some light bulbs;
- element from the boron group used for making cans for beverages;
- element from the second group of the periodic table, the main component of the bones.

Keywords

periodic table of elements, period, group, Mendeleev, chemical element

Glossary

periodic table of elements

[Nagranie dostępne na portalu epodreczniki.pl](#)

Nagranie dźwiękowe słówka.

układ okresowy pierwiastków – tablica przedstawiająca wszystkie pierwiastki chemiczne, uporządkowane kolejno według rosnącej liczby atomowej, w grupach (obejmujących pierwiastki o podobnych właściwościach) i okresach (w których właściwości pierwiastków zmieniają się stopniowo)

Lesson plan (Polish)

Temat: Układ okresowy pierwiastków

Adresat

Uczeń szkoły podstawowej (klasy 7. i 8.)

Podstawa programowa

Szkoła podstawowa. Chemia.

II. Wewnętrzna budowa materii. Uczeń:

6) odczytuje z układu okresowego podstawowe informacje o pierwiastkach (symbol, nazwę, liczbę atomową, masę atomową, rodzaj pierwiastka – metal lub niemetal).

Ogólny cel kształcenia

Uczeń omawia budowę układu okresowego.

Kompetencje kluczowe

- porozumiewanie się w języku ojczystym;
- porozumiewanie się w językach obcych;
- kompetencje matematyczne i podstawowe kompetencje naukowo-techniczne;
- kompetencje informatyczne;
- umiejętność uczenia się.

Kryteria sukcesu

Uczeń nauczy się:

- interpretować prawo okresowości;
- opisywać budowę układu okresowego (wskazywać grupy i okresy);
- określać położenie pierwiastka w układzie okresowym;
- wskazywać metale i niemetale w układzie okresowym;
- odczytywać z układu okresowego podstawowe informacje o pierwiastku (liczbę atomową, masę atomową, rodzaj pierwiastka).

Metody/techniki kształcenia

- **podające**
 - pogadanka.
- **aktywizujące**
 - dyskusja.

- **programowane**
 - z użyciem komputera;
 - z użyciem e-podręcznika.
- **praktyczne**
 - ćwiczeń przedmiotowych.

Formy pracy

- praca indywidualna;
- praca w parach;
- praca całego zespołu klasowego.

Środki dydaktyczne

- e-podręcznik;
- zeszyt i kredki lub pisaki;
- tablica interaktywna, tablety/komputery.

Przebieg lekcji

Faza wstępna

1. Nauczyciel rozdaje uczniom metodniki lub kartki w trzech kolorach: zielonym, żółtym i czerwonym do zastosowania w pracy techniką świateł drogowych. Przedstawia cele lekcji sformułowane w języku ucznia na prezentacji multimedialnej oraz omawia kryteria sukcesu (może przesłać uczniom cele lekcji i kryteria sukcesu pocztą elektroniczną lub zamieścić je np. na Facebooku, dzięki czemu uczniowie będą mogli prowadzić ich portfolio).
2. Prowadzący wspólnie z uczniami ustala – na podstawie wcześniej zaprezentowanych celów lekcji – co będzie jej tematem, po czym zapisuje go na tablicy interaktywnej/tablicy kredowej. Uczniowie przepisują temat do zeszytu.
3. BHP – przed przystąpieniem do eksperymentów uczniowie zapoznają się z kartami charakterystyk substancji, które będą używane na lekcji. Nauczyciel wskazuje na konieczność zachowania ostrożności w pracy z nimi.

Faza realizacyjna

1. Praca w parach. Uczniowie, korzystając z internetu, podręcznika książkowego lub e-podręcznika, szukają informacji na temat historii klasyfikowania pierwiastków. Odpowiadają na pytania: „Kto podejmował próby klasyfikacji pierwiastków?”, „Jakie cechy wspólne pierwiastków zauważyli naukowcy?”, „Kto sformułował prawo okresowości?”. Odpowiedzi zapisują w formularzu zamieszczonym w abstrakcie. Wskazane pary omawiają swoje opracowania na forum klasy.
2. Uczniowie czytają fragment pt. „Jak zbudowany jest układ okresowy pierwiastków?”. Nauczyciel prosi uczniów by obejrzeli film z abstraktu „Jak działa układ okresowy

pierwiastków”. Następnie prowadzący zajęcia wyjaśnia uczniom, jak należy odczytywać informacje z układu okresowego na podstawie dowolnego pierwiastka, np. fluoru, uwzględniając jego położenie w okresie, położenie w grupie, nazwę grupy, liczbę masową, liczbę atomową, liczbę nukleonów, liczbę protonów, liczbę neutronów, liczbę elektronów, liczbę elektronów walencyjnych, liczbę powłok elektronowych, charakter chemiczny pierwiastka, aktywność chemiczną pierwiastka.

3. Nauczyciel wskazuje przykładowe pierwiastki, a chętni uczniowie podają o nich pełne informacje odczytane z układu okresowego.
4. Uczniowie samodzielnie wykonują zamieszczone w abstrakcie ćwiczenia interaktywne sprawdzające stopień opanowania wiadomości poznanych w czasie lekcji. Nauczyciel inicjuje dyskusję, w trakcie której omówione zostają prawidłowe rozwiązania wszystkich ćwiczeń samodzielnie wykonanych przez uczniów.

Faza podsumowująca

1. Nauczyciel odtwarza nagranie abstraktu. Co jakiś czas zatrzymuje je, prosząc uczniów, by opowiedzieli własnymi słowami to, co przed chwilą usłyszeli. W ten sposób uczniowie utrwalają informacje poznane w czasie lekcji oraz ćwiczą słuchanie ze zrozumieniem.
2. Nauczyciel zadaje uczniom pytania:
 - Co na zajęciach wydało wam się ważne i ciekawe?
 - Co było łatwe, a co trudne?
 - Jak możecie wykorzystać wiadomości i umiejętności, które dziś zdobyliście?

Chętni lub wybrani uczniowie podsumowują zajęcia

Praca domowa

1. Wykonaj polecenie nr 4.1.

W tej lekcji zostaną użyte m.in. następujące pojęcia oraz nagrania

Pojęcia

periodic table of elements

[Nagranie dostępne na portalu epodreczniki.pl](#)

Nagranie dźwiękowe słówka.

układ okresowy pierwiastków – tablica przedstawiająca wszystkie pierwiastki chemiczne, uporządkowane kolejno według rosnącej liczby atomowej, w grupach

(obejmujących pierwiastki o podobnych właściwościach) i okresach (w których właściwości pierwiastków zmieniają się stopniowo)

Teksty i nagrania

[Nagranie dostępne na portalu epodreczniki.pl](#)

Nagranie dźwiękowe abstraktu.

Periodic table of elements

The nineteenth century was the time when scientists already knew several dozens of chemical elements. These were examined and described by them. Scientists at the time noticed that among the elements there are those that exhibit similar properties. They were looking for a key according to which they could organize and classify them.

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All groups have been given names that come from the names of the elements at the beginning of the group. Elements belonging to the same group have similar properties. The exception is hydrogen. Although it is located in a group of alkali metals, because of its properties it does not belong to any of the groups.

What shapes can periodic table have?

Some scientists have developed periodic tables with different shapes. However, the method of presenting elements in the form of a table is the most commonly used. It has also been approved by The International Union of Pure and Applied Chemistry, abbreviation **IUPAC** – organization dealing, inter alia, with the standardization of symbols, nomenclature and patterns used by chemists around the world.

The simplest version of the periodic table contains numbered symbols of chemical elements, group numbers and periods. However, there are also such versions that present other additional information (e.g. names of elements and their properties, structure of their atoms, size of atoms, etc.). Regardless of how much information about elements are contained in periodic table, the order of elements, the number of groups, the type of elements in the group and period are identical in each periodic table of elements.

- Periodic table of elements is a universal way of presentation of chemical elements.
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- Elements belonging to one group have similar properties (except for hydrogen).

Lesson plan (English)

Topic: Periodic table of elements

Target group

Elementary school student (grades 7. and 8.)

Core curriculum

Elementary school. Chemistry.

II. Internal structure of matter. Pupil:

6) reads from the periodic table basic information about elements (symbol, name, atomic number, atomic mass, type of element - metal or non-metal).

General aim of education

The student discusses the structure of the periodic table.

Key competences

- communication in the mother tongue;
- communication in foreign languages;
- mathematical competence and basic competences in science and technology;
- digital competence;
- learning to learn.

Criteria for success

The student will learn:

- to interpret the law of periodicity;
- to describe the structure of the periodic table (indicate groups and periods);
- to determine the location of the element in the periodic table;
- to indicate metals and non-metals in the periodic table;
- to read from the periodic table basic information about the element (atomic number, atomic mass, type of element).

Methods/techniques

- **expository**
 - talk.
- **activating**
 - discussion.

- **programmed**
 - with computer;
 - with e-textbook.
- **practical**
 - exercises concerned.

Forms of work

- individual activity;
- activity in pairs;
- collective activity.

Teaching aids

- e-textbook;
- notebook and crayons/felt-tip pens;
- interactive whiteboard, tablets/computers.

Lesson plan overview

Introduction

1. The teacher hands out Methodology Guide or green, yellow and red sheets of paper to the students to be used during the work based on a traffic light technique. He presents the aims of the lesson in the student's language on a multimedia presentation and discusses the criteria of success (aims of the lesson and success criteria can be send to students via e-mail or posted on Facebook, so that students will be able to manage their portfolio).
2. The teacher together with the students determines the topic – based on the previously presented lesson aims – and then writes it on the interactive whiteboard/blackboard. Students write the topic in the notebook.
3. Health and safety – before starting the experiments, students familiarise themselves with the safety data sheets of the substances that will be used during the lesson. The teacher points out the need to be careful when working with them.

Realization

1. Work in pairs. Students, using the Internet, a textbook or e-textbook, are looking for information on the history of classification of elements. They answer the questions: „Who made attempts to classify elements?“, „What common features did the scientists notice?“, „Who formulated the law of periodicity?“. They write their answers in the form provided in the abstract. The indicated couples discuss their studies on the class forum.
2. Students read the fragment „How is the periodic table of elements built?“ The teacher asks pupils to watch the film from the abstract „How the Periodic Table of the Elements

works". Then the lecturer explains to students how to read information from the periodic table based on any element, e.g. fluorine, considering its location in period, position in the group, group name, mass number, atomic number, number of nucleons, number of protons, number of neutrons, the number of electrons, the number of valence electrons, the number of electron shells, the chemical nature of the element, the chemical activity of the element.

3. The teacher indicates examples of elements, and eager students give them full information read from the periodic table.
4. Students carry out the interactive exercises checking the level of knowledge learned during the lesson. The teacher initiates a discussion during which the correct solutions for all the exercises performed by the students are discussed.

Summary

1. The teacher plays the recording of the abstract. Every now and then he stops it, asking the students to tell in their own words what they have just heard. In this way, students consolidate information learned during the lesson and practice listening comprehension.
2. The teacher asks the students questions:
 - What did you find important and interesting in class?
 - What was easy and what was difficult?
 - How can you use the knowledge and skills you have gained today?

Willing/selected students summarize the lesson.

Homework

1. Carry out task number nr 4.1.

The following terms and recordings will be used during this lesson

Terms

periodic table of elements

[Nagranie dostępne na portalu epodreczniki.pl](#)

Nagranie dźwiękowe słówka.

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(obejmujących pierwiastki o podobnych właściwościach) i okresach (w których właściwości pierwiastków zmieniają się stopniowo)

Texts and recordings

Nagranie dostępne na portalu epodreczniki.pl

Nagranie dźwiękowe abstraktu.

Periodic table of elements

The nineteenth century was the time when scientists already knew several dozens of chemical elements. These were examined and described by them. Scientists at the time noticed that among the elements there are those that exhibit similar properties. They were looking for a key according to which they could organize and classify them.

Periodic table of elements is a table listing of all chemical elements ordered by increasing atomic number. The elements are grouped according to cyclically similar properties. Columns are called groups, and rows are called periods. Groups and periods are numbered.

All groups have been given names that come from the names of the elements at the beginning of the group. Elements belonging to the same group have similar properties. The exception is hydrogen. Although it is located in a group of alkali metals, because of its properties it does not belong to any of the groups.

What shapes can periodic table have?

Some scientists have developed periodic tables with different shapes. However, the method of presenting elements in the form of a table is the most commonly used. It has also been approved by The International Union of Pure and Applied Chemistry, abbreviation **IUPAC** – organization dealing, inter alia, with the standardization of symbols, nomenclature and patterns used by chemists around the world.

The simplest version of the periodic table contains numbered symbols of chemical elements, group numbers and periods. However, there are also such versions that present other additional information (e.g. names of elements and their properties, structure of their atoms, size of atoms, etc.). Regardless of how much information about elements are contained in periodic table, the order of elements, the number of groups, the type of elements in the group and period are identical in each periodic table of elements.

- Periodic table of elements is a universal way of presentation of chemical elements.
- In the periodic table, the elements (their symbols) are placed sequentially in the table according to the growing atomic number.

- Vertical columns are called groups and horizontal rows – periods. All groups and periods are numbered.
- Elements belonging to one group have similar properties (except for hydrogen).