

No.	Items	Score																																				
1	<p>Complete the proposed statements using the expressions: <i>equal to, less than, higher than.</i></p> <p>1) The chemical element with the electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^5$ in the volatile compound with hydrogen has the oxidation degree +1.</p> <p>2) The number of electrons in the electron shell of the calcium cation the number of electrons in the electron shell of the chlorine anion.</p> <p>3) The molar mass of the higher oxide of a chemical element, the nucleus of the atom which contains 16 protons, 64 g/mol.</p> <p>4) The mass of methane with a volume of 2,24 l (STP) is with the mass of $6,02 \cdot 10^{22}$ water molecules.</p> <p>5) The higher hydroxide of chemical element with a charge of nucleus +33, by dissolution in water, forms a solution with pH 7.</p>	<table border="1"> <tr><td>L</td></tr> <tr><td>0</td></tr> <tr><td>1</td></tr> <tr><td>2</td></tr> <tr><td>3</td></tr> <tr><td>4</td></tr> <tr><td>5</td></tr> </table>	L	0	1	2	3	4	5	<table border="1"> <tr><td>L</td></tr> <tr><td>0</td></tr> <tr><td>1</td></tr> <tr><td>2</td></tr> <tr><td>3</td></tr> <tr><td>4</td></tr> <tr><td>5</td></tr> </table>	L	0	1	2	3	4	5																					
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2	<p>Gravity dispensers provide opportunities to market food products such as salt, sugar, flour, in a self-serving format, significantly reducing packaging costs. The necessary flowability of the products is ensured by the addition of anti-caking agents.</p> <p>Complete the proposed sentences: in column I – with the symbols of the chemical elements, which are part of an anti-caking agents; in column II – with the characteristics of the substances formed from the atoms of these elements.</p> <table border="1" data-bbox="161 1016 1339 1615"> <thead> <tr> <th></th> <th data-bbox="220 1016 810 1061">I</th> <th data-bbox="810 1016 1339 1061">II</th> </tr> </thead> <tbody> <tr> <td data-bbox="161 1061 220 1205">1</td> <td data-bbox="220 1061 810 1205">The electronic shell of the atom of consists of two energy levels, the last level contains five electrons</td> <td data-bbox="810 1061 1339 1205">Chemical formula of a compound with a polar covalent bond:</td> </tr> <tr> <td data-bbox="161 1205 220 1317">2</td> <td data-bbox="220 1205 810 1317">The chemical element is the most active metal from the 4th period</td> <td data-bbox="810 1205 1339 1317">The type of chemical bond in the compound with bromine:</td> </tr> <tr> <td data-bbox="161 1317 220 1442">3</td> <td data-bbox="220 1317 810 1442">The chemical element contains 6 electrons in the 3d sublevel</td> <td data-bbox="810 1317 1339 1442">Type of crystalline lattice in the simple substance:</td> </tr> <tr> <td data-bbox="161 1442 220 1615">4</td> <td data-bbox="220 1442 810 1615">The sum of the protons and neutrons contained in the nucleus of the most widespread isotope of element is equal to 12</td> <td data-bbox="810 1442 1339 1615">Chemical formula of a compound used in the manufacture of glass:</td> </tr> </tbody> </table>		I	II	1	The electronic shell of the atom of consists of two energy levels, the last level contains five electrons	Chemical formula of a compound with a polar covalent bond:	2	The chemical element is the most active metal from the 4 th period	The type of chemical bond in the compound with bromine:	3	The chemical element contains 6 electrons in the 3d sublevel	Type of crystalline lattice in the simple substance:	4	The sum of the protons and neutrons contained in the nucleus of the most widespread isotope of element is equal to 12	Chemical formula of a compound used in the manufacture of glass:	<table border="1"> <tr><td>L</td></tr> <tr><td>0</td></tr> <tr><td>1</td></tr> <tr><td>2</td></tr> <tr><td>3</td></tr> <tr><td>4</td></tr> <tr><td>5</td></tr> <tr><td>6</td></tr> <tr><td>7</td></tr> <tr><td>8</td></tr> </table>	L	0	1	2	3	4	5	6	7	8	<table border="1"> <tr><td>L</td></tr> <tr><td>0</td></tr> <tr><td>1</td></tr> <tr><td>2</td></tr> <tr><td>3</td></tr> <tr><td>4</td></tr> <tr><td>5</td></tr> <tr><td>6</td></tr> <tr><td>7</td></tr> <tr><td>8</td></tr> </table>	L	0	1	2	3	4	5	6	7	8
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3	<p>Nutritionists warn that excessive consumption of chips can lead to a decrease in the content of vital vitamins in the body due to the synthetic food additive E-221. The quantitative analysis of this compound can be carried out according to the following scheme:</p> $\text{Na}_2\text{SO}_3 + \text{KMnO}_4 + \text{HCl} \rightarrow \text{Na}_2\text{SO}_4 + \text{MnCl}_2 + \text{KCl} + \text{H}_2\text{O}$ <p>Establish for this process: the degrees of oxidation of all elements, the oxidant and the reductant, the oxidation and the reducing processes, determine coefficients by electronic balance method and balance the equation reaction.</p> <p>.....</p> <p>.....</p>	<table border="1"> <tr><td>L</td></tr> <tr><td>0</td></tr> <tr><td>1</td></tr> <tr><td>2</td></tr> <tr><td>3</td></tr> <tr><td>4</td></tr> <tr><td>5</td></tr> <tr><td>6</td></tr> <tr><td>7</td></tr> </table>	L	0	1	2	3	4	5	6	7	<table border="1"> <tr><td>L</td></tr> <tr><td>0</td></tr> <tr><td>1</td></tr> <tr><td>2</td></tr> <tr><td>3</td></tr> <tr><td>4</td></tr> <tr><td>5</td></tr> <tr><td>6</td></tr> <tr><td>7</td></tr> </table>	L	0	1	2	3	4	5	6	7																	
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6	<p>There are given the substances: P, CH₄, Cu(NO₃)₂, H₂, K₂O, H₂SO₄. Using as reagents one of the substances in the proposed row, write an equation of obtaining reaction of the substance indicated below.</p> <p>1) <i>a metal</i></p> <p>2) <i>an oxid acid</i></p> <p>3) <i>a base</i></p> <p>4) <i>an acid</i></p>	<table border="1"> <tr><td>L</td></tr> <tr><td>0</td></tr> <tr><td>1</td></tr> <tr><td>2</td></tr> <tr><td>3</td></tr> <tr><td>4</td></tr> <tr><td>5</td></tr> <tr><td>6</td></tr> <tr><td>7</td></tr> <tr><td>8</td></tr> </table>	L	0	1	2	3	4	5	6	7	8	<table border="1"> <tr><td>L</td></tr> <tr><td>0</td></tr> <tr><td>1</td></tr> <tr><td>2</td></tr> <tr><td>3</td></tr> <tr><td>4</td></tr> <tr><td>5</td></tr> <tr><td>6</td></tr> <tr><td>7</td></tr> <tr><td>8</td></tr> </table>	L	0	1	2	3	4	5	6	7	8							
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7	<p>Innovative technologies in the field of phytopharmaceuticals are aimed at extracting bioactive substances from medicinal plants under the influence of microwaves, using extractants with selective action: <i>hexane</i>, <i>benzene</i>, <i>ethyl ethanoate</i>. Write in the blank spaces of the sentences the letter T, if the statement is true and the letter F, if it is false.</p> <p>1) for <u>hexane</u>: <ul style="list-style-type: none"> • belongs to the homologous series with the general formula C_nH_{2n} (.....) • is a component of natural gas (.....) </p> <p>2) for <u>benzene</u>: <ul style="list-style-type: none"> • it is a cycloalkane (.....) • is obtained by trimerization of acetylene (.....) </p> <p>3) for <u>ethyl ethanoate</u>: <ul style="list-style-type: none"> • is an isomer of butanoic acid (.....) • undergoes a hydrolysis reaction (.....) </p>	<table border="1"> <tr><td>L</td></tr> <tr><td>0</td></tr> <tr><td>1</td></tr> <tr><td>2</td></tr> <tr><td>3</td></tr> <tr><td>4</td></tr> <tr><td>5</td></tr> <tr><td>6</td></tr> </table>	L	0	1	2	3	4	5	6	<table border="1"> <tr><td>L</td></tr> <tr><td>0</td></tr> <tr><td>1</td></tr> <tr><td>2</td></tr> <tr><td>3</td></tr> <tr><td>4</td></tr> <tr><td>5</td></tr> <tr><td>6</td></tr> </table>	L	0	1	2	3	4	5	6											
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8	<p>Isoamyl alcohol (2-methylbutan-1-ol) is a component of the natural flavor of bananas and black truffles.</p> <p>A. Write the structural semi-developed formula:</p> <p>1) of 2-methylbutan-1-ol: </p> <p>2) of an isomer of this compound and indicates its name according to the systematic nomenclature: ;</p> <p>B. For two organic compounds, complete the table in accordance with the indicated characteristics and contain the <i>same number of carbon atoms</i> as 2-methylbutan-1-ol.</p> <table border="1" data-bbox="156 1630 1347 2069"> <thead> <tr> <th>Characteristic of compound</th> <th>Structural semi-developed formula of compound</th> <th>Name of compound according to systematic nomenclature</th> </tr> </thead> <tbody> <tr> <td>It is a homologue of aminopropanoic acid</td> <td></td> <td></td> </tr> <tr> <td>Discolors bromine water</td> <td></td> <td></td> </tr> </tbody> </table>	Characteristic of compound	Structural semi-developed formula of compound	Name of compound according to systematic nomenclature	It is a homologue of aminopropanoic acid			Discolors bromine water			<table border="1"> <tr><td>L</td></tr> <tr><td>0</td></tr> <tr><td>1</td></tr> <tr><td>2</td></tr> <tr><td>3</td></tr> <tr><td>4</td></tr> <tr><td>5</td></tr> <tr><td>6</td></tr> <tr><td>7</td></tr> </table>	L	0	1	2	3	4	5	6	7	<table border="1"> <tr><td>L</td></tr> <tr><td>0</td></tr> <tr><td>1</td></tr> <tr><td>2</td></tr> <tr><td>3</td></tr> <tr><td>4</td></tr> <tr><td>5</td></tr> <tr><td>6</td></tr> <tr><td>7</td></tr> </table>	L	0	1	2	3	4	5	6	7
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SISTEMUL PERIODIC AL ELEMENTELOR CHIMICE

	I	II	III	IV	V	VI	VII	VIII				
1	1 H 1,0079 Hidrogen								2 He 4,0026 Helium			
2	3 Li 6,941 Litiu	4 Be 9,01218 Beriliu	5 B 10,81 Bor	6 C 12,011 Carbon	7 N 14,0067 Azot	8 O 15,9994 Oxygen	9 F 18,9984 Fluor	10 Ne 20,179 Neon				
3	11 Na 22,98977 Sodiu	12 Mg 24,305 Magneziu	13 Al 26,98154 Aluminiu	14 Si 28,0855 Siliciu	15 P 30,97376 Fosfor	16 S 32,06 Sulf	17 Cl 35,453 Clor	18 Ar 39,948 Argon				
4	19 K 39,0983 Potasiu	20 Ca 40,08 Calciu	21 Scandiu	22 Ti 47,88 Titan	23 V 50,9415 Vanadiu	24 Cr 51,996 Crom	25 Mn 54,938 Mangan	26 Fe 55,847 Fier	27 Cobalt	28 Nichel		
	29 Cu 63,546 Cupru	30 Zn 65,38 Zinc	31 Ga 69,72 Galiu	32 Ge 72,59 Germaniu	33 As 74,9216 Arsen	34 Se 78,96 Seleniu	35 Br 79,904 Brom	36 Kr 83,80 Kripton				
5	37 Rb 85,4678 Rubidiu	38 Sr 87,62 Stronțiu	39 Y 88,9059 Ytriu	40 Zr 91,22 Zirconiu	41 Nb 92,9064 Niobiu	42 Mo 95,94 Molibden	43 Tc [98] Tehnețiu	44 Ru 101,07 Ruteniu	45 Rh 102,9055 Rodiu	46 Pd 106,42 Paladiu		
	47 Ag 107,868 Argent	48 Cd 112,41 Cadmium	49 In 114,82 Indiu	50 Sn 118,69 Staniu	51 Sb 121,75 Stibiu	52 Te 127,60 Telur	53 I 126,9045 Iod	54 Xe 131,29 Xenon				
6	55 Cs 132,9054 Ceziu	56 Ba 137,33 Bariu	57* Lantan	72 Hf 178,49 Hafniu	73 Ta 180,948 Tantal	74 W 183,85 Volfram	75 Re 186,207 Reni	76 Os 190,2 Osmiu	77 Ir 192,22 Iridiu	78 Pt 195,08 Platina		
	79 Au 196,9665 Aur	80 Hg 200,59 Mercur	81 Tl 204,383 Taliu	82 Pb 207,2 Plumb	83 Bi 208,9804 Bismut	84 Po [209] Poloniu	85 At [210] Astatiniu	86 Rn [222] Radon				
7	87 Fr [223] Franciu	88 Ra 226,0254 Radium	89** Actiniu	104 Rf [261] Rutherfordium	105 Db [262] Dubnium	106 Sg [263] Seaborgium	107 Bh [262] Bohrium	108 Hs [267,13] Hassium	109 Mt [268,14] Meitnerium	110 Ds [281] Darmstadtium		

*Lantanie

58 Ce 140,12 Ceriu	59 Pr 140,9077 Praseodim	60 Nd 144,24 Neodim	61 Pm [145] Prometiu	62 Sm 150,36 Samariu	63 Eu 151,96 Europiu	64 Gd 157,25 Gadolinu	65 Tb 158,9254 Terbiu	66 Dy 162,50 Disprosiu	67 Ho 164,9304 Holmiu	68 Er 167,26 Erbiu	69 Tm 168,9342 Tuliu	70 Yb 173,04 Yterbiu	71 Lu 174,967 Lutetiu
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**Actinide

90 Th 232,0381 Toriu	91 Pa 231,0359 Protactiniu	92 U 238,0389 Uranu	93 Np 237,0482 Neptuniu	94 Pu [244] Plutoni	95 Am [243] Americiu	96 Cm [247] Curiu	97 Bk [247] Berkeliu	98 Cf [251] Californiu	99 Es [252] Einsteiniu	100 Fm [257] Fermiu	101 Md [258] Mendeleviu	102 No [255] Nobeliu	103 Lr [260] Lawrenciu
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SOLUBILITATEA ACIZILOR, BAZELOR, SĂRURILOR ÎN APĂ

	H ⁺	NH ₄ ⁺	Li ⁺	Na ⁺	K ⁺	Ba ²⁺	Ca ²⁺	Mg ²⁺	Al ³⁺	Cr ³⁺	Zn ²⁺	Mn ²⁺	Fe ²⁺	Fe ³⁺	Pb ²⁺	Cu ²⁺	Ag ⁺
OH ⁻		S↑	S	S	S	S	P	I	I	I	I	I	I	I	I	I	-
F ⁻	S	S	P	S	S	P	I	I	P	I	S	S	I	I	I	S	S
Cl ⁻	S	S	S	S	S	S	S	S	S	S	S	S	S	S	P	S	I
Br ⁻	S	S	S	S	S	S	S	S	S	S	S	S	S	S	P	S	I
I ⁻	S	S	S	S	S	S	S	S	S	S	S	S	S	-	I	-	I
S ²⁻	S↑	S	S	S	S	S	S	S	-	-	I	I	I	-	I	I	I
SO ₃ ²⁻	S↑	S	S	S	S	I	I	I	-	-	I	-	I	-	I	I	I
SO ₄ ²⁻	S	S	S	S	S	I	P	S	S	S	S	S	S	S	I	S	P
CO ₃ ²⁻	S↑	S	S	S	S	I	I	I	-	-	I	I	I	-	I	-	I
SiO ₃ ²⁻	I	-	S	S	S	I	I	I	-	-	I	I	I	-	I	-	-
NO ₃ ⁻	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
PO ₄ ³⁻	S	S	I	S	S	I	I	I	I	I	I	I	I	I	I	I	I
CH ₃ COO ⁻	S	S	S	S	S	S	S	S	S	-	S	S	S	-	S	S	S

Notă: S – substanță solubilă, I – insolubilă, P – puțin solubilă; «-» substanța nu există sau se descompune în apă; ↑ - substanța se degajă sub formă de gaz sau se descompune cu degajare de gaz

SERIA ELECTRONEGATIVITĂȚII

F	O	N	Cl	Br	I	S	C	Se	P	H	As	B	Si	Al	Mg	Ca	Li	Na	K
4,0	3,5	3,07	3,0	2,8	2,5	2,5	2,5	2,4	2,1	2,1	2,0	2,0	1,8	1,5	1,2	1,04	1,0	0,9	0,8

SERIA TENSIUNII METALELOR

Li K Ba Ca Na Mg Al Mn Zn Cr Fe Ni Sn Pb (H) Cu Hg Ag Pt Au