

No.	Items	Score	Score															
1	<p>Encircle the letter T, if the statement is true and the letter F , if it is false.</p> <p>1) T F Isotopes of similar atoms differ among themselves by the number of protons.</p> <p>2) T F In a mol of water there are contained $12,04 \cdot 10^{23}$ molecules.</p> <p>3) T F Oxygen with the mass of 64 g and nitrogen in a quantity of 2 moles in similar conditions occupies the same volume.</p> <p>4) T F In the row of elements with numbers of orders 14-15-16, the acid character of oxides decreases.</p> <p>5) T F Hydroxide of element with the charge of the nucleus +19 can be neutralized with nitric acid solution.</p>	<div>L</div> <div>0</div> <div>1</div> <div>2</div> <div>3</div> <div>4</div> <div>5</div>	<div>L</div> <div>0</div> <div>1</div> <div>2</div> <div>3</div> <div>4</div> <div>5</div>															
2	<p>Japanese diet physicians consider to put pumpkin seeds in the first place of foods table, as their intake stimulates both heart’s activity and efficient elimination of heavy metals from the body.</p> <p>Fill in the gaps:</p> <p>in column I – with symbols of four chemical elements which are consisted in composition of pumpkin seeds;</p> <p>in column II – with characteristics of formed substances from the atoms of these elements.</p> <table><tr><th></th><th>I</th><th>II</th></tr><tr><td>1</td><td>Element is found in the IIIrd period and has constant valence II.</td><td>Type of chemical bond in the compound with chlorine is:</td></tr><tr><td>2</td><td>The oxidation degree of in a volatile compound with hydrogen is equal with -3.</td><td>Formula for higher oxide:</td></tr><tr><td>3</td><td>Electronic configuration of atom is $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2$.</td><td>Type of the crystalline net in the simple substance:</td></tr><tr><td>4</td><td>Electronic cover of atom is formed by two energetic levels, there are contained 6 ē on the last level.</td><td>A physical property of the simple substance:</td></tr></table>		I	II	1	Element is found in the III rd period and has constant valence II.	Type of chemical bond in the compound with chlorine is:	2	The oxidation degree of in a volatile compound with hydrogen is equal with -3.	Formula for higher oxide:	3	Electronic configuration of atom is $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2$.	Type of the crystalline net in the simple substance:	4	Electronic cover of atom is formed by two energetic levels, there are contained 6 ē on the last level.	A physical property of the simple substance:	<div>L</div> <div>0</div> <div>1</div> <div>2</div> <div>3</div> <div>4</div> <div>5</div> <div>6</div> <div>7</div> <div>8</div>	<div>L</div> <div>0</div> <div>1</div> <div>2</div> <div>3</div> <div>4</div> <div>5</div> <div>6</div> <div>7</div> <div>8</div>
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3	<p>Cinnabar, in Arabic „dragon’s blood” is a compound of hidrargyrum from which in ancient times special ink was prepared that was used for signing imperial documents. This pigment can be dissolved only chemically, according to the following reaction scheme:</p> $\text{HgS} + \text{HNO}_3 + \text{HCl} \rightarrow \text{S} + \text{NO} + \text{HgCl}_2 + \text{H}_2\text{O}$ <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> <p>.....</p>	<div>L</div> <div>0</div> <div>1</div> <div>2</div> <div>3</div> <div>4</div> <div>5</div> <div>6</div> <div>7</div>	<div>L</div> <div>0</div> <div>1</div> <div>2</div> <div>3</div> <div>4</div> <div>5</div> <div>6</div> <div>7</div>															

[illegible]

6	<p>Barium sulfate is the component which determines the bright white and a special density of the paper used for printing banknotes, financial fees and valuable documents.</p> <p>Write equations of obtaining reactions of barium sulfate in correspondance with each proposed interaction:</p> <p>1) <i>acid + oxide</i></p> <p>2) <i>oxide + hydroxide</i></p> <p>3) <i>hydroxide + salt</i></p> <p>4) <i>salt + salt</i></p>	<table><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><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>From the row of organic substances with composition: C₄H₈, C₅H₈, C₄H₁₀ choose and write formula of the substance which is an homologue of ethylene:</p> <p>I. Complete the blank spaces of the table for the selected substance:</p> <table><tr><td>1</td><td>Name of class of organic compounds</td><td></td></tr><tr><td>2</td><td>Semi-developed structure formula of substance</td><td></td></tr><tr><td>3</td><td>Name of substance according to systematic nomenclature</td><td></td></tr><tr><td>4</td><td>Semi-developed structure formula of a possible izomer</td><td></td></tr><tr><td>5</td><td>Name of izomer according to systematic nomenclature</td><td></td></tr></table> <p>II. Write a reaction equation of obtaining ethylene:</p> <p>.....</p>	1	Name of class of organic compounds		2	Semi-developed structure formula of substance		3	Name of substance according to systematic nomenclature		4	Semi-developed structure formula of a possible izomer		5	Name of izomer according to systematic nomenclature		<table><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><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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8	<p>For each characteristic presented in column B propose a corresponding organic substance and write its semi-developed structure formula in the reserved space from column A.</p> <table><tr><th>A</th><th>B</th></tr><tr><th>Semi-developed structure formula</th><th>Characteristic of substance</th></tr><tr><td>1)</td><td>1) It corresponds with general formula C_nH_{2n+2}O;</td></tr><tr><td>2)</td><td>2) Contains two bonds π;</td></tr><tr><td>3)</td><td>3) It is a result of esterification reaction;</td></tr><tr><td>4)</td><td>4) It is a component of natural gas;</td></tr><tr><td>5)</td><td>5) Can be identified with Cu(OH)₂.</td></tr></table>	A	B	Semi-developed structure formula	Characteristic of substance	1)	1) It corresponds with general formula C _n H _{2n+2} O;	2)	2) Contains two bonds π;	3)	3) It is a result of esterification reaction;	4)	4) It is a component of natural gas;	5)	5) Can be identified with Cu(OH) ₂ .	<table><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><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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9	There are given the substances: <i>hydrogen, water, nitric acid, bromine water, sodium, silver oxide (amoniac solution).</i>	L	L
	Choose from the proposed row a possible reactive for each substance indicated below and write the corresponding reaction equations, using for organic compounds the semideveloped structure formulas:	0	0
	1) <i>chloroethane</i> :	1	1
	2) <i>ethine</i> :	2	2
	3) <i>phenol</i> ::.....	3	3
	4) <i>ethanal</i> :	4	4
		5	5
		6	6
		7	7
		8	8
10	Specific smell of cheese is determined by presence of an organic acid in this product, which is formed in the maturation process of cheese. Solve the problem. For neutralization of a test (proba) of this saturated monocarboxylic acid with mass of 14,8 g, it was consumed a volume of sodium hydroxide solution of 200 ml with molar concentration NaOH of 1 mol/l. Determine the molecular formula of the acid. <i>It is given:</i> <i>Solution:</i>	L	L
	0	0
	1	1
	2	2
	3	3
	4	4
	5	5
	6	6
	7	7
	8	8
	9	9
	10	10
	11	11
Answer:.....			

11	Complete the blank spaces in the proposed sentences:	L	L
	I. Lillies-of-the-valley (flowers) blossom abundantly in the soil of which watery extract has the concentration of hydroxile ions of 10^{-9} mol/l.	0	0
	Concentration of hydrogen ions in this solution is of..... mol/l, resulting that the pH of the solution is equal with, the medium of the solution is	1	1
	To increase pH value of this solution it is needed to add to it the substance with chemical formula	2	2
	II. When treating plants with copper sulfate (bluestone) solutions, cooper ions are accumulated in soil.	3	3
	Cooper ions in interaction with ions form a precipitate with the chemical formula	4	4
	Expression of solubility product for this compound is:	5	5
	PS (.....) =	6	6
		7	7
	12	An individual enterprise offers people who buy solutions prepared for floral lawns, indicating in their composition the following ions:	L
Fe^{3+} , K^{+} , Cl^{-} , NO_3^{-} , NH_4^{+} , Ca^{2+} .		0	0
The intern laborant performed a qualitative analysis, establishing the presence of three ions in theses solutions.		1	1
A. Make up a possible option of results of performed analysis, filling in the blank spaces from the table:		2	2
		3	3
		4	4
		5	5
		6	6
		7	7
		8	8
	9	9	
	10	10	
	11	11	
	12	12	

SISTEMUL PERIODIC AL ELEMENTELOR CHIMICE

	I	II	III	IV	V	VI	VII	VIII		
1	1 Hidrogen H 1,0079							2 Heliu He 4,0026		
2	3 Litiu Li 6,941	4 Beriliu Be 9,01218	5 Bor B 10,81	6 Carbon C 12,011	7 Azot N 14,0067	8 Oxigen O 15,9994	9 Fluor F 18,9984	10 Neon Ne 20,179		
3	11 Sodiu Na 22,98977	12 Magneziu Mg 24,305	13 Aluminiu Al 26,98154	14 Siliciu Si 28,0855	15 Fosfor P 30,97376	16 Sulf S 32,06	17 Clor Cl 35,453	18 Argon Ar 39,948		
4	19 Potasiu K 39,0983	20 Calciu Ca 40,08	21 Scandiu Sc 44,9559	22 Titan Ti 47,88	23 Vanadiu V 50,9415	24 Crom Cr 51,996	25 Mangan Mn 54,938	26 Fier Fe 55,847	27 Cobalt Co 58,9332	28 Nichel Ni 58,69
	29 Cupru 63,546 Cu	30 Zinc 65,38 Zn	31 Galiu 69,72 Ga	32 Germaniu 72,59 Ge	33 Arsen 74,9216 As	34 Seleniu 78,96 Se	35 Brom 79,904 Br	36 Kripton 83,80 Kr		
5	37 Rubidiu 85,4678 Rb	38 Stronțiu 87,62 Sr	39 Ytriu 88,9059 Y	40 Zirconiu 91,22 Zr	41 Niobiu 92,9064 Nb	42 Molibden 95,94 Mo	43 Tehnețiu [98] Tc	44 Ruteniu 101,07 Ru	45 Rodiu 102,9055 Rh	46 Paladiu 106,42 Pd
	47 Argint 107,868 Ag	48 Cadmiu 112,41 Cd	49 Indiu 114,82 In	50 Staniu 118,69 Sn	51 Stibiu 121,75 Sb	52 Telur 127,60 Te	53 Iod I 126,9045	54 Xenon Xe 131,29		
6	55 Ceziu 132,9054 Cs	56 Bariu 137,33 Ba	57* Lantan 138,9055 La	72 Hafniu 178,49 Hf	73 Tantal 180,948 Ta	74 Volfram 183,85 W	75 Reniu 186,207 Re	76 Osmiu 190,2 Os	77 Iridiu 192,22 Ir	78 Platina 195,08 Pt
	79 Aur 196,9665 Au	80 Mercur 200,59 Hg	81 Talii 204,383 Tl	82 Plumb 207,2 Pb	83 Bismut 208,9804 Bi	84 Poloniu [209] Po	85 Astatiniu [210] At	86 Radon [222] Rn		
7	87 Franciu Fr [223]	88 Radiu 226,0254 Ra	89** Actiniu 227,0278 Ac	104 Rutherfordium [261] Rf	105 Dubnium [262] Db	106 Seaborgium [263] Sg	107 Bohrium [262] Bh	108 Hassium [267,13] Hs	109 Meitnerium [268,14] Mt	110 Uun [?]

*Lantanide

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

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

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

Notă: S – substanță solubilă, I – insolubilă, P – puțin solubil; liniuța înseamnă că substanța nu există sau se descompune în apă.

SERIA ELECTRONEGATIVITĂȚII

F	O	N	Cl	Br	I	S	C	Se	P	H	As	B	Si	Al	Mg	Ca	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	0,9	0,8

SERIA TENSIUNII METALELOR

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