

	Items	Score	Score																																															
1	<p>Circle the letter T, if the statement is true and the letter F, if it is false.</p> <p>1) T F The atoms of ^{23}Na and of ^{24}Mg contains in nucleus the same number of the neutrons.</p> <p>2) T F The atom of the chemical element situated in the periodic table in the 4th period, group 7, secondary subgroup, contains on the last energy level 7 electrons.</p> <p>3) T F The chemical element contains in nucleus 34 protons in the volatile compound with hydrogen has the oxidation degree -2.</p> <p>4) T F The chemical element with the electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$ has more pronounced metallic properties than the element with the relative atomic mass of 85.</p> <p>5) T F The mass of nitrogen with a volume of 44,8 l (STP) is equal with the mass of $12,04 \cdot 10^{23}$ carbon (II) oxide molecules</p> <p>6) T F The oxide of the element with atomic number 16 in interaction with water forms a solution in which phenolphthalein is colored in raspberry.</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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2	<p>Zeolites are natural minerals considered true "molecular sieves" for capturing and removing toxins and heavy metals from air, water and the human body. The absorbent effect is determined by the specific composition and structure of a complex of substances formed by the atoms of the following chemical elements:</p> <p style="text-align: center;"><i>Ca, F, O, Al, Si, H, Fe.</i></p> <p>Compose and write in the reserved space the chemical formula of <i>an appropriate substance</i> for each proposed characteristic, using <i>only</i> the elements from this row:</p> <table border="1"> <thead> <tr> <th></th> <th><i>Characteristic of the substance</i></th> <th><i>Chemical formula</i></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>The molecules of the substance are formed by polar covalent bonds</td> <td></td> </tr> <tr> <td>2</td> <td>A double bond is formed between the atoms of the substance</td> <td></td> </tr> <tr> <td>3</td> <td>The substance contains particles with electronic configuration $1s^2 2s^2 2p^6$</td> <td></td> </tr> <tr> <td>4</td> <td>The chemical bond between the particles of the substance is realized by a common electron cloud</td> <td></td> </tr> <tr> <td>5</td> <td>The substance is an oxide of „d” element</td> <td></td> </tr> <tr> <td>6</td> <td>Hydrogen bonds are formed between the molecules of the substance</td> <td></td> </tr> <tr> <td>7</td> <td>Compound substance that has amphoteric properties</td> <td></td> </tr> <tr> <td>8</td> <td>The substance is used in glass manufacture</td> <td></td> </tr> </tbody> </table>		<i>Characteristic of the substance</i>	<i>Chemical formula</i>	1	The molecules of the substance are formed by polar covalent bonds		2	A double bond is formed between the atoms of the substance		3	The substance contains particles with electronic configuration $1s^2 2s^2 2p^6$		4	The chemical bond between the particles of the substance is realized by a common electron cloud		5	The substance is an oxide of „d” element		6	Hydrogen bonds are formed between the molecules of the substance		7	Compound substance that has amphoteric properties		8	The substance is used in glass manufacture		<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>Powder metallurgy is a modern technology for producing auto parts by pressing metal powder. The addition of manganese (II) sulfide to the initial mixture increases the mechanical processing capacity of the obtained parts.</p> <p>In the laboratory this compound can be identified according to the following scheme:</p> $\text{MnS} + \text{HNO}_3 \rightarrow \text{S} + \text{NO} + \text{Mn}(\text{NO}_3)_2 + \text{H}_2\text{O}$ <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>	<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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<p>6 There are given the substances: H₂O, Al, ZnSO₄, H₂, SiO₂, H₃PO₄. Select from this row one common reagent for each pair of proposed substances and write the reactions equations.</p> <p>I. Copper (II) oxide and chlorine</p> <p>a)</p> <p>b)</p> <p>II. Sodium hydroxide and calcium carbonate</p> <p>a)</p> <p>b)</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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<p>7 Complete the sentences by noting in the reserved space the structural semi-developed formula of an <i>organic substance</i> corresponding to the proposed characteristic.</p> <p>1) Corresponds to the general formula C_nH_{2n-2}</p> <p>2) Corresponds to the molecular formula C₄H₈O₂ and has acidic properties</p> <p>3) Contains carbon atoms only in the <i>sp</i>³ hybridization state</p> <p>4) It is a component of disinfectant solutions</p> <p>5) Can be identified with the copper (II) hydroxide</p>	<p>.....</p> <p>.....</p> <p>.....</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> </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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<p>8 I. Complete the blank spaces of the table:</p> <table border="1" data-bbox="151 1366 1340 1780"> <thead> <tr> <th></th> <th><i>Structural semi-developed formula of substance</i></th> <th><i>Name of substance according to systematic nomenclature</i></th> <th><i>Name of the class of organic compounds</i></th> </tr> </thead> <tbody> <tr> <td>1</td> <td> $\begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3 - \text{C} - \text{C} = \text{CH} - \text{CH}_3 \\ \quad \\ \text{CH}_3 \quad \text{CH}_3 \end{array}$ </td> <td></td> <td></td> </tr> <tr> <td>2</td> <td></td> <td>3-methylpentanal</td> <td></td> </tr> </tbody> </table> <p>II. Circle the letter T, if the statement is true and the letter F, if it is false.</p> <p>a) T F Substance number (1) is a homologue of ethylene.</p> <p>b) T F Substance number (2) is an isomer of hexanal.</p> <p>c) T F Substance number (1) is a position isomer of 2,4,4-trimethylpent-2-ene.</p> <p>d) T F Both substances (1) and (2) may be involved in the hydrogenation reaction.</p>		<i>Structural semi-developed formula of substance</i>	<i>Name of substance according to systematic nomenclature</i>	<i>Name of the class of organic compounds</i>	1	$\begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3 - \text{C} - \text{C} = \text{CH} - \text{CH}_3 \\ \quad \\ \text{CH}_3 \quad \text{CH}_3 \end{array}$			2		3-methylpentanal			<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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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 Oxigen	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 44,9559 Scandiu	22 47,88 Titan	23 50,9415 Vanadiu	24 51,996 Crom	25 54,938 Mangan	26 55,847 Fier	27 58,9332 Cobalt	28 58,69 Nichel			
	29 63,546 Cupru	30 65,38 Zinc	31 69,72 Galiu	32 72,59 Germaniu	33 74,9216 Arsen	34 78,96 Seleniu	35 79,904 Brom	36 83,80 Kripton					
5	37 85,4678 Rubidiu	38 87,62 Stronțiu	39 88,9059 Ytriu	40 91,22 Zirconiu	41 92,9064 Niobiu	42 95,94 Molibden	43 [98] Tehnețiu	44 101,07 Ruteniu	45 102,9055 Rodiu	46 106,42 Paladiu			
	47 107,868 Argint	48 112,41 Cadmium	49 114,82 Indiu	50 118,69 Staniu	51 121,75 Stibiu	52 127,60 Telur	53 126,9045 Iod	54 131,29 Xenon					
6	55 132,9054 Ceziu	56 137,33 Bariu	57* 138,9055 Lantan	72 178,49 Hafniu	73 180,948 Tantal	74 183,85 Volfram	75 186,207 Reniu	76 190,2 Osmiu	77 192,22 Iridiu	78 195,08 Platina			
	79 196,9665 Aur	80 200,59 Mercur	81 204,383 Taliu	82 207,2 Plumb	83 208,9804 Bismut	84 [209] Poloniu	85 [210] Astatiniu	86 [222] Radon					
7	87 [223] Franciu	88 226,0254 Radium	89** 227,0278 Actiniu	104 [261] Rutherfordium	105 [262] Dubnium	106 [263] Seaborgium	107 [262] Bohrium	108 [267,13] Hassium	109 [268,14] Meitnerium	110 [281] Darmstadtium			

*Lantanie

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

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