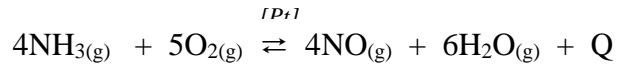


Items		Score																
1	<p>Complete the proposed statements using the expressions: <i>equal to, less than, greater than.</i></p> <p>1) The electronegativity of the chemical element with $Z = 16$ iselectronegativity of the chemical element with relative atomic mass of 31.</p> <p>2) The number of electrons in the electron shell of the argon atom is.....the number of electrons in the electron shell of the potassium cation.</p> <p>3) The molar mass of the volatile compound with hydrogen of the chemical element containing 7 protons in the nucleus of the atom is18 g / mol.</p> <p>4) Under normal conditions carbon oxide (IV) with a mass of 88 g occupies a volume.....the volume of $12,04 \cdot 10^{23}$ molecules of hydrogen.</p> <p>5) The solution of the higher hydroxide of the chemical element with the charge of the nucleus +37 has the pH 7.</p>	L	L															
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		2	2															
		3	3															
		4	4															
5	5																	
2	<p>Anti-dandruff serums have balanced complexes of bioactive substances that stimulate the processes of nutrition, hydration and treatment of the skin and skin fiber.</p> <p>Complete the proposed statements: in column I - with the symbols of the chemical elements, which enter into the composition of the anti-dandruff serums; in column II - with the characteristics of the substances formed by the atoms of these elements.</p> <table border="1"> <thead> <tr> <th></th> <th>I</th> <th>II</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>The electronic configuration of the.....atom is $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^4$</td> <td>The chemical formula of the higher oxide:.....</td> </tr> <tr> <td>2</td> <td>The electronic shell of the atom of the chemical element of contains 20 electrons</td> <td>The type of chemical bond in the compound with chlorine:.....</td> </tr> <tr> <td>3</td> <td>.....of the element is the most active non-metal from the 3rd period</td> <td>Chemical formula of a compound with a polar covalent bond:.....</td> </tr> <tr> <td>4</td> <td>.....of the chemical element is situated in the periodic table in the 4th period, group 2, secondary subgroup</td> <td>Type of crystal lattice in the simple substance:.....</td> </tr> </tbody> </table>		I	II	1	The electronic configuration of the.....atom is $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^4$	The chemical formula of the higher oxide:.....	2	The electronic shell of the atom of the chemical element of contains 20 electrons	The type of chemical bond in the compound with chlorine:.....	3of the element is the most active non-metal from the 3rd period	Chemical formula of a compound with a polar covalent bond:.....	4of the chemical element is situated in the periodic table in the 4th period, group 2, secondary subgroup	Type of crystal lattice in the simple substance:.....	L	L
			I	II														
		1	The electronic configuration of the.....atom is $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^4$	The chemical formula of the higher oxide:.....														
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3	<p>"Nitrite salt" (E-250) is a product specially designed for the dry processing of meat before smoking. Quantitative analysis of potassium nitrite in this additive can be realized according to the following scheme:</p> $\text{KNO}_2 + \text{KMnO}_4 + \text{H}_2\text{SO}_4 \rightarrow \text{KNO}_3 + \text{MnSO}_4 + \text{K}_2\text{SO}_4 + \text{H}_2\text{O}$ <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>	L	L															
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7	7																	

4 Nitric acid is one of the strongest acids, the oldest records of its use being associated with the experiments of alchemists and "aqua regia" (latin for "royal water"). One of the steps in obtaining this acid corresponds to the following chemical equation:



Circle the letter T, if the statement is true and the letter F, if it is false.

- a) **T F** The yield of the direct reaction increases when temperature decreases.
- b) **T F** When the ammonia concentration decreases, the chemical equilibrium shifts to the final products.
- c) **T F** The pressure variation does not influence the chemical equilibrium.
- d) **T F** When water is removed from the reaction medium, the chemical equilibrium shifts to the final products.

L
0
1
2
3
4

L
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4

5 Calcium chloride has the property of gelling fruit paste and berries ensuring the necessary consistency for the preparation of marmalade. According to food safety standards the optimum content of this additive in marmalade is 300 mg/kg.

Solve the problem.

A sample of technical calcium oxide with a mass of 14 g, containing 20% impurities, was treated with 400 ml of hydrochloric acid solution with a molar concentration of acid of 1.5 mol / l.

- a) Calculate the mass of calcium chloride obtained.
- b) Give arguments by calculations, if this amount of calcium chloride will be sufficient to produce 50 kg of marmalade.

It is given:

Solution:

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Answer : a) ; b)

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L
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12

6	<p>There are given the substances: BaCO₃, Mg, NH₃, Cu(OH)₂, SO₃, HCl. Write an <i>equation of obtaining reaction</i> for the substances indicated below, using in each case as reagent one of the substances from the proposed row.</p> <p>1) <i>a non-metal</i></p> <p>2) <i>a basic oxide</i></p> <p>3) <i>a salt</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>Papillomas are dermatological formations, which in the early stages can be removed with the help of pharmacological preparations based on acetic acid, phenol, glycerol. Write in the blank spaces the letter T, if the statement is true and the letter F, if it is false:</p> <p>1) <i>for phenol:</i></p> <ul style="list-style-type: none"> • belongs to the homologous series with the general formula C_nH_{2n-6} (.....) • can be identified with iron (III) chloride (.....) <p>2) <i>for acetic acid:</i></p> <ul style="list-style-type: none"> • is a carboxylic compound (.....) • is formed by the hydrolysis of proteins (.....) <p>3) <i>for glycerol:</i></p> <ul style="list-style-type: none"> • contains two hydroxyl groups (.....) • is a product of photosynthesis (.....) 	<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>Isovaleric aldehyde (3-methylbutanal) is a component of eucalyptus, citrus and green tea essential oils. A. Write the semi-developed structure formulas:</p> <p>1) of 3-methylbutanal:</p> <p>2) of an isomer of this compound and indicate its name according to the systematic nomenclature:;</p> <p>B. Complete the table for two organic compounds that correspond to the indicated characteristics and contain <i>the same number of carbon atoms</i> as 3-methylbutanal.</p> <table border="1" data-bbox="165 1574 1356 2016"> <thead> <tr> <th>Characteristics of compound</th> <th>Structural semi-developed formula of the compound</th> <th>Name of compound according to systematic nomenclature</th> </tr> </thead> <tbody> <tr> <td>is a homologue of propene</td> <td></td> <td></td> </tr> <tr> <td>is a product of the esterification reaction</td> <td></td> <td></td> </tr> </tbody> </table>	Characteristics of compound	Structural semi-developed formula of the compound	Name of compound according to systematic nomenclature	is a homologue of propene			is a product of the esterification reaction			<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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11 The quality of the steaks depends on the pH of the meat from which they are prepared. In order to regulate the needed acidity, the semi-finished products are soaked for a while in alkaline solutions with a pH equal to 9. It is not recommended to use more concentrated solutions, as they can affect the texture and taste of the product.

Solve the problem. For the preparation of a solution of sodium hydroxide with a volume of 40 l, 8 ml of sodium hydroxide solution with 2% NaOH mass fraction and a density of 1 g / ml were used.

- a) Calculate the pH of the prepared solution.
 b) Give arguments by calculations, if this solution will be suitable for preparing meat for steaks.

It is given:

Solution:

.....

Answer: a) ; b)

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12 Pyrotechnics, from the Greek "pyr" - fire and "technique" - mastery, is associated with the technology of preparing flammable mixtures, which burn spectacularly, creating special luminescent and sound effects.

A. Complete the blank spaces of the table for two salts used in pyrotechnics: the first - to create a bright green color, the second - as a component of fire-fighting powders.

<i>Salt formula</i>	<i>Formula of the identification reagent</i>	<i>Analytic signal</i>
1. BaCl ₂	a) for cation: b) for anion:	a) b)
2	a) for cation: b) for anion:	a) gas with a pungent odorous, colors the wet litmus paper in blue b) colorless gas that causes turbidity lime water

B. Write an equation of identification reaction in molecular form (ME), completed ionic (CIE) and reduced ionic (RIE) according with the data from the table.

..... (ME)
 (CIE)
 (RIE)

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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 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 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 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	55 132,9054 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 Fr [223] Franciu	88 Ra 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 Ceriu	59 140,9077 Praseodim	60 144,24 Neodim	61 [145] Prometiu	62 150,36 Samariu	63 151,96 Europiu	64 157,25 Gadolinu	65 158,9254 Terbiu	66 162,50 Disprosiu	67 164,9304 Holmiu	68 167,26 Erbiu	69 168,9342 Tuliu	70 173,04 Yterbiu	71 174,967 Lutetiu
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**Actinide

90 232,0381 Toriu	91 231,0359 Protactiniu	92 238,0389 Uranu	93 237,0482 Neptuniu	94 [244] Plutoniu	95 [243] Americiu	96 [247] Curiu	97 [247] Berkeliu	98 [251] Californiu	99 [252] Einsteiniu	100 [257] Fermiu	101 [258] Mendeleviu	102 [255] Nobeliu	103 [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