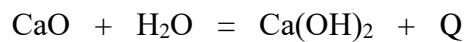


No.	Items	Score										
		1	2									
1	<p>Sea buckthorn fruits have an antiviral effect, being extremely rich in vitamins, minerals and active substances. Their composition includes the following chemical elements: <i>Fe, P, Mg, C</i>.</p> <p>Complete the blank spaces in the statements below:</p> <p>a) <i>For iron:</i> It is situated in the 4th period, in the group , the subgroup, contains in the nucleus protons and neutrons.</p> <p>b) <i>For phosphorus:</i> Has the spread of electrons on energetic levels , it forms higher oxide with the chemical formula , the character of the higher oxide is</p> <p>c) <i>For magnesium:</i> Has on the last energy level electrons, it forms hydroxide with the chemical formula</p> <p>d) <i>For carbon:</i> Forms a volatile compound with hydrogen with the chemical formula and its called</p>	L 0 1 2 3 4 5 6 7 8 9 10 11	L 0 1 2 3 4 5 6 7 8 9 10 11									
2	<p>Signal flares are needed by hunters, fishermen, geologists, and rescuers. The signal cartridge, which produces a bright color signal, includes a mixture of substances that contains the chemical elements: <i>Ba, N, O, Cl, Cu, H</i>.</p> <p>I. Using only the proposed chemical elements, compose and write in the space reserved the chemical formula of a substance corresponding to each type of chemical bond:</p> <p>a) nonpolar covalent bond _____</p> <p>b) polar covalent bond _____</p> <p>c) ionic bond _____</p> <p>d) metal bond _____</p> <p>II. Write for a substance with a <i>nonpolar covalent bond</i>:</p> <p>a) a physical property _____</p> <p>b) a specific field of use _____</p> <p>III. Write the equation of the obtaining reaction for the substance with a <i>ionic bond</i>:</p>	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8									
3	<p>Zinc chloride is used as an electrolyte in batteries that increases their lifetime and provides higher power.</p> <p>I. Complete the blank spaces in the table for the substances used to obtain zinc chloride:</p> <table border="1"> <thead> <tr> <th>Class of compounds</th> <th>Formula of the substance</th> <th>Name of substance</th> </tr> </thead> <tbody> <tr> <td></td> <td>ZnO</td> <td></td> </tr> <tr> <td></td> <td>HCl</td> <td></td> </tr> </tbody> </table> <p>II. Write the equations of the obtaining reactions of the <i>zinc chloride</i>:</p> <p>1) $\text{ZnO} + \text{HCl} \rightarrow$ _____ + _____</p> <p>2) $\text{Zn} + \text{HCl} \rightarrow$ _____ + _____</p>	Class of compounds	Formula of the substance	Name of substance		ZnO			HCl		L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
Class of compounds	Formula of the substance	Name of substance										
	ZnO											
	HCl											

- 4** Calcium hydroxide is widely used as an acidity regulator in the production of whipped cream and baby food products. It is obtained according to the reaction:



L	L
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7

I. Characterize this reaction (indicate its type) according to three criteria:

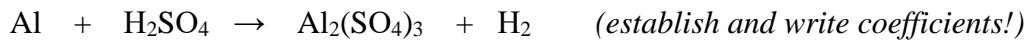
- a) _____
 b) _____
 c) _____

II. Complete the reaction schemes, that characterize the chemical properties of *calcium hydroxide* with formulas of substances and coefficients:

- a) $\text{Ca}(\text{OH})_2 + \text{Na}_3\text{PO}_4 \rightarrow$ _____ + _____
 b) $\text{Ca}(\text{OH})_2 + \text{CO}_2 \rightarrow$ _____ + _____

- 5** The color of the flowers can be changed in different ways. In order for the hydrangea to turn blue, it is watered with a solution of aluminum sulfate.

Solve the problem. Calculate the weight of aluminum sulfate, obtained at the interaction of aluminum with a mass of 5,4 g with sulfuric acid solution, if the reaction proceeds according to the scheme:



It is given:

Solution:

L	L
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8

Answer: _____

6	<p>Write in the blank spaces of the proposed statements, the letter T, if the statement is true, and the letter F, if the statement is false:</p> <ol style="list-style-type: none"> 1) The substance NH_3 is well soluble in water (.....). 2) Electrolytes are substances that, in solutions and melts, conduct electrical current (.....). 3) The alkaline base solutions have $\text{pH} < 7$ (.....). 4) In the line of elements Li-Na-K, the metallic properties decrease (.....). 5) In industry, hydrogen is produced by the decomposition of methane (.....). 6) 3 mol of sulfur (IV) oxide occupies a volume of 44.8 l (STP) (.....). 7) 40 g of solution with a mass fraction of 20% contains 8 g of dissolved substance (.....). 	<table border="1" style="width: 100%; border-collapse: collapse;"> <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								
L																			
0																			
1																			
2																			
3																			
4																			
5																			
6																			
7																			
7	<p><i>Copper (II) sulfide</i> nanoparticles are used in optoelectronic devices, solar cells, and biomedicine.</p> <p>I. Write in the space reserved, the chemical formulas and dissociation equations of two soluble salts at the interaction of which the <i>copper (II) sulfide</i> is formed, using the solubility table:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"><i>Soluble salt formula, containing</i></td> <td style="width: 50%; text-align: center;"><i>Dissociation equation</i></td> </tr> <tr> <td>ion Cu^{2+} _____</td> <td style="text-align: center;">_____</td> </tr> <tr> <td>ion S^{2-} _____</td> <td style="text-align: center;">_____</td> </tr> </table> <p>II. Write the equation of the obtaining reaction of the <i>copper (II) sulfide</i> in molecular form (ME), completed ionic (CIE) and reduced ionic (RIE), using the solubility table and the formulas of the salts formed:</p> <p style="text-align: right;">(ME)</p> <p style="text-align: right;">(CIE)</p> <p style="text-align: right;">(RIE)</p>	<i>Soluble salt formula, containing</i>	<i>Dissociation equation</i>	ion Cu^{2+} _____	_____	ion S^{2-} _____	_____	<table border="1" style="width: 100%; border-collapse: collapse;"> <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> <tr><td>9</td></tr> </table>	L	0	1	2	3	4	5	6	7	8	9
<i>Soluble salt formula, containing</i>	<i>Dissociation equation</i>																		
ion Cu^{2+} _____	_____																		
ion S^{2-} _____	_____																		
L																			
0																			
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
8	<p>Complete the blank spaces in the proposed statements.</p> <ol style="list-style-type: none"> 1. The substance $\text{C}_6\text{H}_5\text{-OH}$ is called _____ and one of its chemical properties is its interaction with _____. 2. <i>Starch</i> is found in nature in the composition of _____ and can be identified with solution of _____. 3. <i>α-Amino acids</i> are formed upon hydrolysis of _____ and contain functional groups $-\text{NH}_2$ and _____. 4. <i>Glycerol</i> belongs to the class of _____ and is used _____. 	<table border="1" style="width: 100%; border-collapse: collapse;"> <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							
L																			
0																			
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			

9

I. Complete the blank spaces of the table:

No.	Structural semi-developed formula of the substance	Name of substance	Class of organic compounds
1.	$\text{CH}_3\text{---CH}_2\text{---CH---CH}_3$ OH		
2.		pent-2-ine	
3.			aldehydes

L	0
1	2
2	3
3	4
4	5
5	6
6	7
7	8
8	9
9	10

II. Write the structural semi-developed formula and the name of an *isomer* for the substance 1:

(formula)

(name)

III. Write the structural semi-developed formula and the name of a *homologue* for the substance 2:

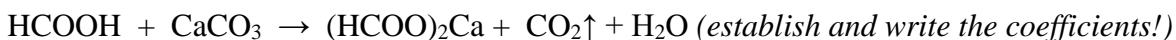
(formula)

(name)

10

Calcium formate is used as an additive in construction mortar and all types of concrete to accelerate the setting speed of cement, especially in winter construction.

Solve the problem. Calculate the weight of calcium formate, obtained at the interaction of formic acid and calcium carbonate, if 2,24 l (STP) of carbon (IV) oxide are obtained. The reaction proceeds according to the scheme:



It is given:

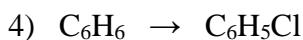
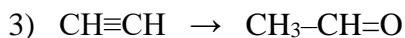
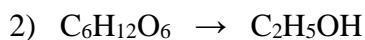
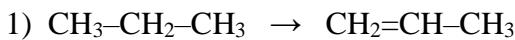
Solution:

Answer: _____

L	0
1	2
2	3
3	4
4	5
5	6
6	7

11

Write the reaction equations for the schemes below:



L
0
1
2
3
4
5
6
7
8

L
0
1
2
3
4
5
6
7
8

12

I. Write, to the left of the order numbers of the substances in column **A**, the letter corresponding to the field of use in column **B**:

A**B**

1. ethene

a) production of synthetic rubber

2. methane

b) as a flavoring agent

3. methyl ethanoate

c) as a fuel

4. buta-1,3-diene

d) preservative used in the food industry

5. ethanoic acid

e) production of polyethylene

L
0
1
2
3
4
5
6
7
8
9

L
0
1
2
3
4
5
6
7
8
9

II. Characterize one of the proposed substances according to the plan:

a) chemical formula _____

b) a physical property

c) the reaction equation that characterizes a chemical property:

SISTEMUL PERIODIC AL ELEMENTELOR CHIMICE

	I	II	III	IV	V	VI	VII	VIII		
1	1 H Hidrogen 1,0079							2 Heliu He 4,0026		
2	3 Li Lituu 6,941	4 Be Beriliu 9,01218	5 B Bor 10,81	6 C Carbon 12,011	7 N Azot 14,0067	8 O Oxigen 15,9994	9 F Fluor 18,9984	10 Neon Ne 20,179		
3	11 Na Sodiu 22,98977	12 Mg Magneziu 24,305	13 Al Aluminiu 26,98154	14 Si Siliciu 28,0855	15 P Fosfor 30,97376	16 S Sulf 32,06	17 Cl Clor 35,453	18 Argon Ar 39,948		
4	19 K Potasiu 39,0983	20 Ca Calciu 40,08	21 Sc Scandiu 44,9559	22 Ti Titan 47,88	23 V Vanadiu 50,9415	24 Cr Crom 51,996	25 Mn Mangan 54,938	26 Fe Fier 55,847	27 Co Cobalt 58,9332	28 Ni Nichel 58,69
5	29 Rb Cupru 63,546	30 Zn Zinc 65,38	31 Ga Galiu 69,72	32 Ge Germaniu 72,59	33 As Arsen 74,9216	34 Se Seleniu 78,96	35 Br Brom 79,904	36 Kripton Kr 83,80		
6	37 Rb Rubidiu 85,4678	38 Sr Stronțiu 87,62	39 Y Ytriu 88,9059	40 Zr Zirconiu 91,22	41 Nb Niobiu 92,9064	42 Mo Molibden 95,94	43 Tc Tehnetiu [98]	44 Ru Ruteniu 101,07	45 Rh Rodiu 102,9055	46 Pd Paladiu 106,42
7	47 Ag Argint 107,868	48 Cd Cadmiu 112,41	49 In Indiu 114,82	50 Sn Staniiu 118,69	51 Sb Stibiu 121,75	52 Te Telur 127,60	53 I Iod 126,9045	54 Xenon Xe 131,29		
8	55 Cs Ceziu 132,9054	56 Ba Bariu 137,33	57* La Lantan 138,9055	72 Hf Hafniu 178,49	73 Ta Tantal 180,948	74 W Volfram 183,85	75 Re Reniu 186,207	76 Os Osmiu 190,2	77 Ir Iridiu 192,22	78 Pt Platina 195,08
9	79 Au Aur 196,9665	80 Hg Mercur 200,59	81 Tl Taliu 204,383	82 Pb Plumb 207,2	83 Bi Bismut 208,9804	84 Po Poloniu [209]	85 At Astatiniu [210]	86 Radon Rn [222]		
10	87 Fr Franciu [223]	88 Ra Radiu 226,0254	89** Ac Actiniu [261]	104 Rf Rutherfordium [262]	105 Dubnium [263]	106 Sg Seaborgium [263]	107 Bh Bohrium [262]	108 Hs Hassium [267,13]	109 Mt Meitnerium [268,14]	110 Ds Darmstadtium [281]

*Lantanide

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

90 Th Toriu 232,0381	91 Pa Protactiniu 231,0359	92 U Uraniu 238,0389	93 Np Neptuniu 237,0482	94 Pu Plutoniu [244]	95 Am Americiu [243]	96 Cm Curiu [247]	97 Bk Berkeliu [247]	98 Cf californiu [251]	99 Es Einsteiniu [252]	100 Fm Fermiu [257]	101 Md Mendeleviu [258]	102 No Nobeliu [255]	103 Lr Lawrenciu [260]
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SOLUBILITATEA ACIZILOR, BAZELOR, Săruriilor 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	P	I	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; «» substanță nu există sau se descompune în apă; ↑ - substanță 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