No	Items	Score	
		1	2
1	Complete the blank space of the proposed sentences: 1) Name of the chemical element that has the spread of electrons on energetic levels 2ē 8ē 7ē is ..... and shows in the compounds the maximum valency ..... and minimum valency ..... 2) The atom of the chemical element with atomic number 26 contains in its nucleus ..... protons and ..... neutrons. 3) The volatile compound of carbon with hydrogen has the formula ..... and is called ..... 4) In the line Si – P – S, the non-metallic properties…… . 5) The element with nucleus charge +12 forms higher hydroxide with the formula ..... . 6) The element that forms higher oxide with the composition E_2O_3 is called	L 0 1 2 3 4 5 6 7 8 9 10	L 0 1 2 3 4 5 6 7 8 9 10
2	Powder extinguishers contain mineral salts of alkali metals and propellant gases. **I.** Write in the blank space to the right of the formulas of substances used in fire fighting, the appropriate type of chemical bond: 1) KCl _____ 2) CO_2 _____ 3) N_2 _____ **II.** Select and write in the space reserved the formula of a substance from the above proposed, appropriate to characteristic: a) the substance is solid, soluble in water_____ ; b) the substance is a gas heavier than air_____; c) the substance is the main component of air _____; d) the substance is used for gasification of water _____.	L 0 1 2 3 4 5 6 7	L 0 1 2 3 4 5 6 7
3	*Potassium hydroxide* is used as an electrolyte in alkaline batteries. **I.** Complete the reaction schemes which characterize the chemical properties of *potassium hydroxide*, with the formulas of the substances and the appropiate coefficients: a) $KOH + AlCl_3 \rightarrow$ _____ b) $KOH + SO_3 \rightarrow$ _____ c) $KOH + H_2SO_4 \rightarrow$ _____ **II.** Write the reaction equation of obtaining of *potassium hydroxide*, according to the scheme: *Metal oxide + water* _____	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

4 *Sodium carbonate* is the main component of preparations for regulating the pH of water in the pool. In the industry, it is obtained by the following reaction:

$$2NaHCO_3 = Na_2CO_3 + CO_2 + H_2O - Q$$

I. Characterize this reaction according to the proposed criteria by filling in the blank spaces of the table:

No.	*Criteria*	*Type of the reaction*
1	The thermal effect	
2	Direction of the reaction	
3	Composition and number of reactants and products	

II. Write the equations of reactions that characterize the chemical properties of *sodium carbonate* according to the proposed schemes by selecting the substances from the line:

HCl, $Ba(NO_3)_2$, HNO_3, $CaCl_2$

a) Na_2CO_3 + acid: _____

b) Na_2CO_3 + salt: _____

L
0
1
2
3
4
5
6
7

L
0
1
2
3
4
5
6
7

5 *Ammonium sulfate* is used as a food additive to improve the structure, shape and volume of bakery products.

Solve the problem. Calculate the weight of ammonium sulfate, obtained at the interaction of ammonia with the volume of 4,48 l (STP) with sulfuric acid, if the reaction proceeds according to the scheme:

$$NH_3 + H_2SO_4 \rightarrow (NH_4)_2SO_4$$ *(establish and write coefficients!)*

It is given: *Solution:*

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

*Answer:*_____

L
0
1
2
3
4
5
6
7

L
0
1
2
3
4
5
6
7

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

1) **T F** The number of neutrons in the nucleus is determined by the atomic number of the element in the periodic table.
2) **T F** Hydrogen bonds are formed between water molecules.
3) **T F** In industry, hydrogen is produced by the decomposition of methane.
4) T **F** Diamond and graphite are allotropic modifications of carbon.
5) **T F** Sulfur (IV) oxide is an odorless gas.
6) **T F** The alkaline base solutions have pH < 7.
7) **T F** 200 g of a solution and a mass fraction of 10% of the dissolved substance contains 20 g of a substance.

L
0
1
2
3
4
5
6
7

L
0
1
2
3
4
5
6
7

7 Silica Gel packets, which are dried granules of *silicic acid*, are used to absorb moisture from shoe boxes and leather bags.

I. Fill in the blank spaces of the table below with the chemical formulas and the names of the soluble substances, at the interaction of which the *silicic acid* is formed:

No.	*Ions*	*The chemical formula of a soluble substance*	*Name of substance*
1	H^+		
2	SiO_3^{2-}		

II. Write the equation of the obtaining reaction of the *silicic acid* in molecular form (ME), completed ionic (CIE) and reduced ionic (RIE), using the solubility table and the formulas of the substances composed:

_____ (ME)

_____ (CIE)

_____ (RIE)

L
0
1
2
3
4
5
6
7
8
9

L
0
1
2
3
4
5
6
7
8
9

8 Choose and write in the space reserved, the word from the brackets that correctly completes each of the statements:

1) The general formula of alkanes is ..... *(C_nH_{2n} / C_nH_{2n+2})*
2) Methanal is an ..... gas. (*odorless / with a specific odor)*
3) ..... are used as flavorers. *(arene / esters).*
4) Phenol is identified with ..... *(Copper(II) oxide / iron(III) chloride)*
5) The aminoethanoic acid contains the functional groups –COOH and ..... *(-NH_2 / -NO_2)*
6) Glycerol and ethylene glycol are ..... *(polyalcohols / monoalcohols)*
7) At the hydrolysis of cellulose, ... is formed. *(starch / glucose)*
8) When the proteins are heated, ... occurs. *(denaturation / hydrolysis)*

L
0
1
2
3
4
5
6
7
8

L
0
1
2
3
4
5
6
7
8

9 Alkenes, which contain five carbon atoms, are raw materials for the production of synthetic rubber.

It is proposed the alkene: $CH_2=C(CH_3)-CH_2-CH_3$

For this alkene:

I. Write the name according to the systematic nomenclature: _____

II. Write the molecular formula of the substance and the general formula of the homologous series:

_____ _____

molecular formula *formula of the homologous series*

III. Complete the blank spaces of the table:

	Structural semi-developed formula	*Name*
Chain isomer		
Double bond position isomer		
Homologue		

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

10 *Calcium formate* is used in building mortar and all types of concrete in order to accelerate cement hardening.

Solve the problem. Calculate the weight of calcium formate obtained from formic acid with a weight of 92 g, if the reaction proceeds according to the following scheme:

$HCOOH + CaCO_3 \rightarrow (HCOO)_2Ca + CO_2\uparrow + H_2O$ *(establish and write coefficients!)*

It is given: *Solution:*

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Answer: _____

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

11 **I.** For each substance in column **A** select a possible reagent in column **B** and indicate the corresponding letter in the space reserved:

A	**B**
1) ..... CH_3COOH	a) KOH
2) ..... $C_6H_5–OH$	b) H_2
3) ..... $CH_2=CH_2$	c) Na

II. Write the equations of chemical reactions for the chosen interactions:

1) _____

2) _____

3) _____

L
0
1
2
3
4
5
6
7
8
9

L
0
1
2
3
4
5
6
7
8
9

12 **I.** Complete the blank spaces of the table with the structural semi-developed formulas and the names of the organic substances corresponding to the characteristics:

No.	*Characteristic of substance*	*Structural semi-developed formula*	*Name of the substance*
1	Corresponds to the general formula C_nH_{2n-2}		
2	It is obtained by the esterification reaction		
3	Participate in the silver mirror reaction		
4	It is used in medicine as an antiseptic		

II. Write a physical property for the substance obtained by the *esterification* reaction:

_____

III. Write the equation of the obtaining reaction for the substance used as *an antiseptic:*

_____

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

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 44,9559 **Sc**	22 Titan 47,88 **Ti**	23 Vanadiu 50,9415 **V**	24 Crom 51,996 **Cr**	25 Mangan 54,938 **Mn**	26 Fier 55,847 **Fe**	27 Cobalt 58,9332 **Co**	28 Nichel 58,69 **Ni**
	29 Cupru 63,546 **Cu**	30 Zinc 65,38 **Zn**	31 Galiu **Ga** 69,72	32 Germaniu **Ge** 72,59	33 Arsen **As** 74,9216	34 Seleniu **Se** 78,96	35 Brom **Br** 79,904	36 Kripton **Kr** 83,80		
5	37 Rubidiu **Rb** 85,4678	38 Stronțiu **Sr** 87,62	39 Ytriu 88,9059 **Y**	40 Zirconiu 91,22 **Zr**	41 Niobiu 92,9064 **Nb**	42 Molibden 95,94 **Mo**	43 Tehneţiu [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 **In** 114,82	50 Staniu **Sn** 118,69	51 Stibiu **Sb** 121,75	52 Telur **Te** 127,60	53 Iod **I** 126,9045	54 Xenon **Xe** 131,29		
6	55 Ceziu **Cs** 132,9054	56 Bariu **Ba** 137,33	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 Taliu **Tl** 204,383	82 Plumb **Pb** 207,2	83 Bismut **Bi** 208,9804	84 Poloniu **Po** [209]	85 Astatiniu **At** [210]	86 Radon **Rn** [222]		
7	87 Franciu **Fr** [223]	88 Radiu **Ra** 226,0254	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 Darmstadtium [281] **Ds**

*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** Luteţiu 174.967

**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]

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_3COO^-	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 ELECTRONEGATIVITĂŢII

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