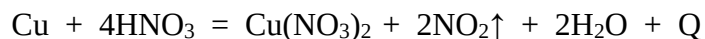


No.	Items	Score																												
		1	2																											
1	Pomegranate is a healthy fruit, rich in vitamins, minerals and antioxidants. The most important chemical elements in the composition of pomegranate are: <i>K, P, Mg, O, Na, H, Fe.</i> Select for each characteristic <i>an element</i> of the above proposed and write its chemical symbol in the reserved space in the table. <table><tr><th>No.</th><th>Characteristic of the element</th><th>Chemical symbol</th></tr><tr><td>1</td><td>The atom of the chemical element contains 11 protons and 12 neutrons in its nucleus</td><td></td></tr><tr><td>2</td><td>It has the spread of electrons on energy levels 2ē8ē14ē2ē</td><td></td></tr><tr><td>3</td><td>It exhibits a constant valency of I in compounds</td><td></td></tr><tr><td>4</td><td>It is the most active metal of the 4th period</td><td></td></tr><tr><td>5</td><td>It forms a higher oxide with the formula EO</td><td></td></tr><tr><td>6</td><td>It forms a higher hydroxide with the composition H₃EO₄</td><td></td></tr><tr><td>7</td><td>It forms the volatile compound with hydrogen with the composition H₂E</td><td></td></tr><tr><td>8</td><td>The simple substance is a gas that is lighter than air</td><td></td></tr></table>	No.	Characteristic of the element	Chemical symbol	1	The atom of the chemical element contains 11 protons and 12 neutrons in its nucleus		2	It has the spread of electrons on energy levels 2ē8ē14ē2ē		3	It exhibits a constant valency of I in compounds		4	It is the most active metal of the 4 th period		5	It forms a higher oxide with the formula EO		6	It forms a higher hydroxide with the composition H ₃ EO ₄		7	It forms the volatile compound with hydrogen with the composition H ₂ E		8	The simple substance is a gas that is lighter than air		L	L
		No.	Characteristic of the element	Chemical symbol																										
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		0	0																											
1	1																													
2	2																													
3	3																													
4	4																													
5	5																													
6	6																													
7	7																													
8	8																													
2	Various chemicals are used for food packaging. Aluminum provides protection against light and air, carbon oxide (IV) reduces the growth of bacteria, and nitrogen prevents the oxidation of food. I. Write, in the reserved space, the type of chemical bond for each substance used in food packaging: a) CO₂ _____ b) N₂ _____ c) Al _____ II. For the substance CO₂, write the equation of obtaining reaction: _____ III. For the substance N₂, write the equation of hydrogen interaction: _____ IV. For the substance Al, write two physical properties: 1. _____ 2. _____	L	L																											
		0	0																											
		1	1																											
		2	2																											
		3	3																											
		4	4																											
		5	5																											
		6	6																											
		7	7																											
		8	8																											
		9	9																											
3	<i>Calcium oxide</i>, also known as lime, is used in agriculture to neutralize acidic soils and improve their fertility. I. Write the reaction equation of obtaining of calcium oxide, according to the scheme: <i>metal + oxygen → oxide</i>: _____ II. Write the equations of reactions that characterize the chemical properties of calcium oxide according to the proposed schemes: 1. CaO + water: _____ 2. CaO + acid: _____ 3. CaO + acid oxide: _____	L	L																											
		0	0																											
		1	1																											
		2	2																											
		3	3																											
		4	4																											
		5	5																											
		6	6																											
		7	7																											
		8	8																											

4	<i>Nitric acid</i> is used to etch copper: making drawings, signs or patterns on its surface. Nitric acid oxidizes copper, turning it into soluble nitrate according to the reaction:
---	--



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

<i>No.</i>	<i>Criteria</i>	<i>Type of reaction</i>
1	The thermal effect	
2	Direction of the reaction	
3	The presence of the catalyst	

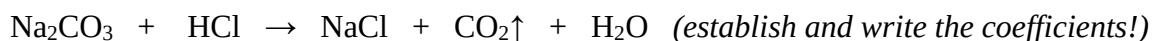
II. Complete the reaction schemes that characterize the chemical properties of *nitric acid*, with the formulas of the substances and the corresponding coefficients:

a) $\text{HNO}_3 + \text{Ba}(\text{OH})_2 \rightarrow$ _____ $+$ _____

b) $\text{HNO}_3 + \text{K}_2\text{SiO}_3 \rightarrow \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$

5	<i>Dry ice</i> , produced from carbon (IV) oxide, has a significantly greater cooling effect than regular ice.
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Solve the problem. Calculate the volume of carbon (IV) oxide (*STP*), obtained at the interaction of sodium carbonate with hydrochloric acid solution with a mass of 73 g and with a mass fraction of 10 % HCl, if the reaction proceeds according to the scheme:



It is given:

Solution:

[illegible]

Answer:

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

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

6	Circle the letter T , if the statement is true and the letter F , if it is false. 1) T F The number of electrons in the outermost energy level is equal to the period number. 2) T F In the line of elements Li-Na-K, the metallic properties decrease. 3) T F Electrolytes are substances that, in solution or in the molten state, conduct electricity. 4) T F In the laboratory, oxygen is obtained by the decomposition of hydrogen peroxide. 5) T F Sulfur (VI) oxide, when it reacts with water, forms a solution with a pH > 7. 6) T F The reaction between an acid with a base is called a neutralization reaction. 7) T F Sodium chloride is used in the food industry as a preservative.	L 0 1 2 3 4 5 6 7	L 0 1 2 3 4 5 6 7
7	Bordeaux mixture is a fungicidal preparation containing a fine precipitate of copper (II) hydroxide, which coats plants and prevents the development of mold and other fungi. I. Write in the reserved space the chemical formulas and dissociation equations of the substances at the intersection of which the <i>copper(II) hydroxide</i> is formed, using the solubility table: Chemical formula Dissociation equation a) copper (II) sulfate _____ b) alkaline base _____ II. Write the equation for the reaction between copper (II) sulfate and the alkaline base in molecular form (ME), completed ionic (CIE) and reduced ionic (RIE), using the solubility table and the formulas of the substances formed: _____(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	Write in the blank space to the left of the characteristics in column A , the letter corresponding to the substance in the column B : A B 1. It is a saturated hydrocarbon2. It is formed during the hydrolysis of fats3. It participates in a polymerization reaction4. It can be identified using Cu(OH) ₂5. It corresponds to the general formula C _n H _{2n+2}6. It forms an alcohol when it reacts with water7. It is used as a fuel a) glycerol b) propane c) ethylene	L 0 1 2 3 4 5 6 7	L 0 1 2 3 4 5 6 7

9	I. Complete the blank spaces of the table:			L	L
	Name of the class of organic compounds	Structural semi-developed formula of a representative compound	Name according to the systematic nomenclature	0	0
			2-methylpropanoic acid	1	1
		CH ₃ -CH ₂ -CH ₂ -CH ₂ -OH		2	2
	II. For the substance CH ₃ -CH ₂ -CH ₂ -CH ₂ -OH, write the structural semi-developed formula of			3	3
	a) a chain isomer:			4	4
	_____			5	5
	(formula) _____ (name) _____			6	6
	b) a position isomer of the OH group:			7	7
	_____			8	8
(formula) _____ (name) _____			9	9	
c) a homologue:			10	10	

(formula) _____ (name) _____					
10	Acetic aldehyde (ethanal) is used in the manufacture of mirrors. For the manufacture of a mirror with a surface of 1 m ² , 1.08 g of silver is required.			L	L
	Solve the problem. a) Calculate the mass of silver obtained at the interaction of acetic aldehyde with the mass of 44 g with silver oxide.			0	0
	b) Calculate the number of mirrors that can be made from the silver obtained. The reaction proceeds according to the following scheme:			1	1
	CH ₃ -CH=O + Ag ₂ O → CH ₃ -COOH + Ag (establish and write coefficients!)			2	2
	It is given: _____ Solution: _____			3	3
	_____			4	4
	_____			5	5
	_____			6	6
	_____			7	7
	_____			8	8
Answer: a) _____ b) _____					

11	Complete the reaction schemes with the formulas of the products and the corresponding coefficients: 1) $\text{CH}\equiv\text{CH} + \text{Br}_2 \rightarrow$ _____ 2) $\text{CH}_3\text{COOH} + \text{Na}_2\text{O} \rightarrow$ _____ 3) $\text{CH}_3-\text{C}\begin{matrix} \text{O} \\ \parallel \\ \text{O}-\text{CH}_3 \end{matrix} + \text{HOH} \rightarrow$ _____ 4) $\text{C}_6\text{H}_5-\text{OH} + \text{K} \rightarrow$ _____	L	L																				
		0	0																				
		1	1																				
		2	2																				
		3	3																				
		4	4																				
		5	5																				
		6	6																				
		7	7																				
		8	8																				
12	I. From the row: $\text{C}_6\text{H}_{12}\text{O}_6$; C_6H_6 ; $\text{CH}_2=\text{CH}-\text{CH}=\text{CH}_2$; $\text{CH}_3-\text{CH}_2-\text{OH}$ select one substance for each characteristic and write its formula and name in the corresponding spaces in the table. <table><tr><th>No.</th><th>Characteristic of the substance</th><th>Chemical formula of the substance</th><th>Name of the substance</th></tr><tr><td>1</td><td>It is obtained from the trimerization of acetylene</td><td></td><td></td></tr><tr><td>2</td><td>On polymerization, it forms synthetic rubber</td><td></td><td></td></tr><tr><td>3</td><td>Participates in the fermentation reaction</td><td></td><td></td></tr><tr><td>4</td><td>It can be identified with copper (II) oxide</td><td></td><td></td></tr></table> II. For the substance $\text{CH}_3-\text{CH}_2-\text{OH}$, write a concrete field of use: _____ III. For the substance $\text{CH}_2=\text{CH}-\text{CH}=\text{CH}_2$, write the equation of obtaining reaction of the substance: _____	No.	Characteristic of the substance	Chemical formula of the substance	Name of the substance	1	It is obtained from the trimerization of acetylene			2	On polymerization, it forms synthetic rubber			3	Participates in the fermentation reaction			4	It can be identified with copper (II) oxide			L	L
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7	7																						
8	8																						
9	9																						
10	10																						
11	11																						

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 Oxygen	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 Sc 44,9559 Scandiu	22 Ti 47,88 Titan	23 V 50,9415 Vanadiu	24 Cr 51,996 Crom	25 Mn 54,938 Mangan	26 Fe 55,847 Fier	27 Co 58,9332 Cobalt	28 Ni 58,69 Nichel	
	29 Cu 63,546 Cupru	30 Zn 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 Y 88,9059 Ytriu	40 Zr 91,22 Zirconiu	41 Nb 92,9064 Niobiu	42 Mo 95,94 Molibden	43 Tc [98] Tehnețiu	44 Ru 101,07 Ruteniu	45 Rh 102,9055 Rodiu	46 Pd 106,42 Paladiu	
	47 Ag 107,868 Argint	48 Cd 112,41 Cadmiu	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 Cs 132,9054 Ceziu	56 Ba 137,33 Bariu	57* La 138,9055 Lantan	72 Hf 178,49 Hafniu	73 Ta 180,948 Tantal	74 W 183,85 Volfram	75 Re 186,207 Reni	76 Os 190,2 Osmiu	77 Ir 192,22 Iridiu	78 Pt 195,08 Platina	
	79 Au 196,9665 Aur	80 Hg 200,59 Mercur	81 Tl 204,383 Taliu	82 Pb 207,2 Plumb	83 Bi 208,9804 Bismut	84 Po [209] Poloni	85 At [210] Astatiniu	86 Rn [222] Radon			
7	87 Fr [223] Franciu	88 Ra 226,0254 Radiu	89** Ac 227,0278 Actiniu	104 Rf [261] Rutherfordium	105 Db [262] Dubnium	106 Sg [263] Seaborgium	107 Bh [262] Bohrium	108 Hs [267,13] Hassium	109 Mt [268,14] Meitnerium	110 Ds [281] Darmstadtium	

*Lantanide

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

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