

VARIANT 5

For tasks 1-2, use the following row of chemical elements. The answer is a **sequence of digits**, under which the chemical element in this row is indicated.

1)Be 2)H 3)F 4)Li 5)Si

1. Determine from the elements indicated above which atoms have lack of one electron to complete the electron layer

Write down the numbers of the selected items in the answer field

Answer:

2. Choose from elements indicated above three ones which located in one period of Mendeleev's Periodic table. Arrange these elements according increasing of atomic radius.

Write down the numbers of the selected items in the required sequence in the answer field.

Answer:

3. Select two compounds from the list below which form hydrogen bond between the molecules

- 1) methane
- 2) silane
- 3) ethanol
- 4) phosphine
- 5) formic acid

Write down the numbers of the selected items in the answer field

Answer:

4. Establish a correspondence between the formula of the substance and the class / group to which this substance belongs. Select the corresponding position indicated by a digit for each position indicated by a letter.

FORMULA OF SUBSTANCE

CLASS or GROUP

- A) HMnO_4
- B) KHSiO_3
- C) CO

- 1) acidic oxide
- 2) non-salt forming oxide
- 3) acid
- 4) acid salt

Write down the selected figures in the table under the corresponding letters

Answer:

A	B	C

5. From the proposed list of substances, select two substances that interact with water at room temperature.

- 1) potassium
- 2) silicon
- 3) copper
- 4) fluorine
- 5) oxygen

Write down the numbers of the selected items in the answer field

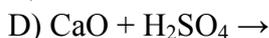
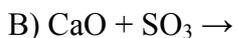
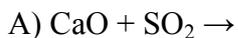
Answer:

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6. Establish a correspondence between the reacting substances and the product (s) of their interaction. Select the corresponding position indicated by a digit for each position indicated by a letter.

REAGENTS

PRODUCTS



Write down the selected figures in the table under the corresponding letters

Answer:

A	B	C	D

7. The following scheme for the transformation of substances is given



Determine which of these substances are substances X and Y.

- 1) H_2
- 2) H_2O_2
- 3) H_2O
- 4) ZnSO_4
- 5) K_2SO_4

Write down the numbers of the selected substances in the answer field

Answer:

X	Y

8. Establish a correspondence between the name of the substance and the class / group to which this substance belongs. Select the corresponding position indicated by a digit for each position indicated by a letter

NAME OF SUBSTANCE

CLASS or GROUP

A) methyl benzoate

1) alcohol

B) ethylene glycol

2) amino acid

C) alanine

3) ester

4) nitro compound

Write down the selected figures in the table under the corresponding letters

Answer:

A	B	C

9. Select two substances that are homologous:

1) benzene

2) styrene

3) toluene

4) glycerol

5) glycine

Write down the numbers of the selected items in the answer field

Answer:

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10. Select two substances that bleach bromine water

1) propane

2) ethylene

3) divinyl

4) cyclopentane

5) isobutane

Write down the numbers of the selected substances in the answer field

Answer:

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11. Select two substances with which ethanol reacts.

- 1) potassium
- 2) aluminum hydroxide
- 3) nitrogen
- 4) potassium bicarbonate
- 5) formic acid

Write down the numbers of the selected items in the answer field

Answer:

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12. The following scheme for the transformation of substances is given



Determine which of these substances are substances X and Y.

- 1) H_2 (catalyst)
- 2) H_2O_2
- 3) $\text{H}_2\text{O}(\text{Hg}^{2+})$
- 4) $\text{KMnO}_4(\text{H}^+)$
- 5) O_2 (catalyst)

Write down the selected figures in the table under the corresponding letters

Answer:

X	Y

13. Establish a correspondence between the formula of salt and the products of electrolysis of its aqueous solution, which were released on inert electrodes. Select the corresponding position indicated by a digit for each position indicated by a letter.

SUBSTANCE FORMULA	ELECTROLYSIS PRODUCTS
A) $\text{Al}(\text{NO}_3)_3$	1) metal and oxygen
B) $\text{Hg}(\text{NO}_3)_2$	2) hydrogen and oxygen
C) KCl	3) hydrogen and halogen
D) CsNO_3	4) metal and halogen
	5) metal and nitric oxide (IV)

Write down the selected figures in the table under the corresponding letters

Answer:

A	B	C	D

14. Establish a correspondence between the formula of salt and the medium of its aqueous solution. Select the corresponding position indicated by a digit for each position indicated by a letter.

SUBSTANCE FORMULA	SOLUTION MEDIUM
A) $\text{Fe}(\text{NO}_3)_3$	1) acidic
B) KClO_4	2) alkaline
C) NH_4Br	3) neutral
D) Na_2CO_3	

Write down the selected figures in the table under the corresponding letters

Answer:

A	B	C	D

15. Establish a correspondence between the equation of a reversible chemical reaction and the simultaneous change in external conditions, leading to a shift in the chemical equilibrium towards the reaction products. Select the corresponding position indicated by a digit for each position indicated by a letter.

REACTION EQUATION	CHANGE OF EXTERNAL CONDITIONS
A) $\text{N}_{2(g)} + 3\text{H}_{2(g)} \leftrightarrow 2\text{NH}_{3(g)} + \text{Q}$	1) increase in temperature and hydrogen concentration
B) $\text{H}_2\text{O}_{(g)} + \text{CH}_4 \leftrightarrow 3\text{H}_{2(g)} + \text{CO}_{(g)} - \text{Q}$	2) decrease in temperature and hydrogen concentration
C) $\text{H}_{2(g)} + \text{I}_{2(solid)} \leftrightarrow 2\text{HI}_{(g)} - \text{Q}$	3) increase in temperature and decrease in hydrogen concentration
D) $\text{C}_2\text{H}_6_{(g)} \leftrightarrow \text{C}_2\text{H}_4_{(g)} + \text{H}_2_{(g)} - \text{Q}$	4) decrease in temperature and increase in hydrogen concentration

Write down the selected figures in the table under the corresponding letters

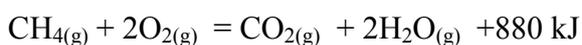
Answer:

A	B	C	D

16. 5 ml of water and 10 g of sodium nitrate was added to 200 g of a solution of the same salt with a mass fraction of 12%. What is the mass fraction of salt in the resulting solution?

Answer: _____ %.

17. As a result of the reaction, the thermochemical equation of which is



the combustion of 56 liters of methane produces heat in an amount _____ kJ.

Answer: _____ kJ.

18. From the proposed list of substances: potassium hypochlorite, potassium hydroxide, iron (III) sulfate, chromium (III) oxide, magnesium oxide, sodium iodide, select substances between which an oxidation-reduction reaction is possible in an alkaline environment.

Specify the oxidizing agent. _____

Specify a reducing agent _____

What is the oxidation product in this reaction? _____

How many electrons does the oxidizing agent take in a given reaction _____

19. In a 18% hot solution of phosphoric acid weighing 60 g, 2.84 g of phosphorus (V) oxide was dissolved. 30 g of sodium hydroxide was added to the resulting solution. Calculate the mass fraction of salt in the resulting solution.

Indicate in the answer:

What salt is formed as a result of the reaction _____

The mass of salt formed

Answer: _____ g

The mass of the final solution

Answer: _____ g

Mass fraction of salt in the resulting solution

Answer: _____ %

20. The combustion of 2.55 g of organic substance gave 3.36 l of carbon dioxide, and 3.15 g of water. It is known that this substance does not enter into an esterification reaction and does not interact with metallic sodium. It can be obtained in one step from isopropanol. Indicate in the answer:

A) Based on the calculations, indicate the molar ratio C: H: O

B) Name the substance

C) Indicate the type of reaction by which this compound can be obtained..