OPTION 1

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)S   2)H   3)I   4)Na   5)Mg

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 substances from the list below which has covalent polar bond

1)CaO
2)P_4
3)K_2S
4)HCl
5)SO_2

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) $HClO_4$ 1) base
B) $NaHCO_3$ 2) normal salt
C) Na_2SO_4 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 potassium at room temperature.

1) water   4) calcium hydroxide

2) carbon dioxide   5) oxygen

3) copper

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

Answer:

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

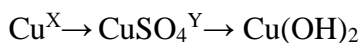REAGENTS   PRODUCTS

A) $K_2O + SO_2 \rightarrow$ 1) K_2SO_4

B) $K_2O + SO_3 \rightarrow$ 2) $K_2SO_4 + H_2$

C) $K_2O + H_2SO_3 \rightarrow$ 3) $K_2SO_4 + H_2O$

D) $K_2O + H_2SO_4 \rightarrow$ 4) K_2SO_3

                                                      5) $K_2SO_3 + H_2$

                                                      6) $K_2SO_3 + H_2O$

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

$Cu \xrightarrow{X} CuSO_4 \xrightarrow{Y} Cu(OH)_2$

Determine which of these substances are substances X and Y.

1) NaOH

2) H_2O_2

3) $H_2SO_{4solution}$

4) $ZnSO_4$

5) $H_2SO_{4concentrated}$

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) $C_6H_{12}O_6$ 1) alcoholds
B) $C_6H_5C_2H_5$ 2) carbohydrates
C) $C_6H_5CH_2OH$ 3) ethers
                                           4) hydrocarbons

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

Answer:

A	B	C

9. Select two substances from the list below that are butene-1 isomers

1) butene-2
2) butane
3) butadiene-1,3

4) methylpropene
5) methylcyclobutane

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

10. Select two substances that bleach bromine water

1) ethane
2) ethin
3) 2-methylbutadiene-1,3
4) cyclohexane
5) butane

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

Answer:

11. Select two substances with which ethanal reacts.

1) hydrogen
2) aluminum hydroxide
3) copper (II) hydroxide

4) potassium bicarbonate
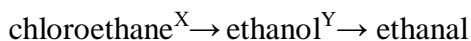5) formic acid

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

Answer

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

chloroethane^X→ ethanol^Y→ ethanal

Determine which of these substances are substances X and Y.

1) H_2 (catalyst)
2) NaOH aqueous solution
3) NaOH alcohol solution
4) CuO
5) HCl

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) $Ca(NO_3)_2$	1) metal and oxygen
B) $Cu(NO_3)_2$	2) hydrogen and oxygen
C) NaCl	3) hydrogen and halogen
D) $LiNO_3$	4) metal and halogen
	5) metal and nitrogen dioxide

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) $CrCl_3$	1) acidic

B) K_2SO_4 2)   alkaline

C) $CuBr_2$ 3)   neutral

D) neutral

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 equilibrium shift with decreasing temperature. Select the corresponding position indicated by a digit for each position indicated by a letter.

REACTION EQUATION   EQUILIBRIUM SHIFT

A) $N_{2(g)} + 3H_{2(g)} \leftrightarrow 2NH_{3(g)} + Q$ 1)   Towards direct reaction

B) $H_2O_{(g)} + CH_4 \leftrightarrow 3H_{2(g)} + CO_{(g)} -Q$ 2)   Towards the reverse reaction

C) $H_{2(g)} + I_{2(s)} \leftrightarrow 2HI_{(g)} -Q$ 3)   No equilibrium shift occurs

D) $C_2H_{6(g)} \leftrightarrow C_2H_{4(g)} + H_{2(g)} -Q$

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

Answer:

A	B	C	D

16. 20 ml of water was added to 180 g of the solution with a mass fraction of sodium acetate 5%. What is the mass fraction of salt in the resulting solution?

Answer:_____% (Write down the number to the nearest tenth.)

17. As the result of a reaction whose thermochemical equation is given below

$2Cl_2O_{7(g)} = 2Cl_{2(g)} + 7O_{2(g)} + 574$ kJ
6 mol of chlorine was formed. Determine the amount of heat released during this reaction

Answer:_____ kJ (Write down the integer number)

18. From the proposed list of substances: potassium chloride, potassium hydroxide, iron (III) sulfate, potassium permanganate, magnesium oxide, potassium iodide, sulfuric acid, chi substances between which an oxidation-reduction reaction is possible in the acidic 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. Phosphoric acid weighing 39.2 g reacted with 250 g of a 24% sodium hydroxide 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 (Write down the number to the nearest tenth.)

The mass of the resulting solution

Answer:_____ _____g (Write down the number to the nearest tenth.)

Mass fraction of salt in the resulting solution

Answer:_____ _____% (Write down the number to the nearest tenth.)

20**.** The combustion of 27,6 g of organic compound gave 13,44 liters of carbon dioxide, and 10,8 g of water. It is known that this compound enters into an esterification reaction and interacts with metallic sodium.

In the answer indicate:

A) The molar ratio of C: H: O in compound   (Proof with calculations)

B) Name the compound

 C) Indicate the type of reaction of the substance with metallic sodium.