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Ministry of Health of the Russian Federation

State Budget Educational Institution of Higher Education

“Ryazan Acad. I. I. Pavlov State Medical University”

of Ministry of Health of the Russian Federation

(SBEI HPE RyazSMU of Ministry of Health of Russia)

**Chemistry Examination Paper**

**Instructions for performing the work**

The examination paper consists of 27 tasks.

One hour (60 minutes) is allotted to complete the examination paper on chemistry.

Answers to the questions are a digit (a number). Choose the correct answer and put it into the matrix.

If you have made a mistake and want to correct it, cross it and write the correct answer.

**Examination Sample Paper**

**1.** **The electronic formula 1s22s22p63s23p3 belongs to the atom, which makes oxides:**

  1) CO2

2) P2O5

3) SO3

4) PbO2

Choose one correct answer from the proposed options.

**2. In which series the chemical elements are arranged in the increasing order of the atom radius:**

  1) Mg – Ca – Sr

2) S – Se – O

3) N – O – F

4) Si – C – N

Choose one correct answer from the proposed options.

**3. The shortest bond between carbon atoms in a molecule:**

  1) С3Н8

2) С2Н4

3) С2Н6

4) С6Н6

Choose one correct answer from the proposed options.

**4.** **Manganese has the greatest oxidation degree in the following compound**:

  1) MnCl2

2) KMnO4

3) K2MnO4

4) MnO2

Choose one correct answer from the proposed options.

**5.** **Ammonium nitrate (NН4NO3) has the following chemical bonds:**

  1) metal and ionic

2) ionic and polar covalent

3) ionic and non-polar covalent

4) polar covalent and non-polar covalent

Choose one correct answer from the proposed options.

**6.  Among the compounds below**

  A) CH3COOH

B) H2CO3

C) H3PO4

D) C6H5COOH

E) HNO3

F) H2SO3

**monoacids are:**

  1) BDF

2) BCF

3) ADE

4) BDE

Choose one correct answer from the proposed options.

**7. All the three compounds can react with water:**

  1) Ca ; Na2O2 ; Br2

2) Zn ; NaCl ; HCl

3) AgNO3 ; Na ; C6H6

4) Mg ; NaNO3 ; CH4

Choose one correct answer from the proposed options.

**8. Aluminium oxide (Al2O3) reacts with each of the two compounds:**

  1) NaOH и H2O

2) HCl и H2O

3) HCl и NaOH

4) CH3COOH и NH4OH

Choose one correct answer from the proposed options.

**9.** **Establish a correspondence between the reactants indicated with letters and the products of the reactions indicated with numbers:**

REACTANTS REACTION PRODUCTS

А) Cu+ HNO3(к)→ 1) Cu(NO3)2+NO2+ H2O

B) Cu+ HNO3(p)→ 2) Cu(NO3)2+ H2O

C) CuSO4 +NaOH → 3) Cu(NO3)2+NO+ H2O

D) Cu(OH)2 + HNO3(к)→ 4) Cu(OH)2+Na2SO4

Put the selected numbers into the table under the corresponding letters.

|  |  |  |  |
| --- | --- | --- | --- |
| А | B | C | D |
|  |  |  |  |

**10.** **A solution of sodium hydroxide (NaОН) reacts with each of the compounds:**

  1) MgSO4; NaCl ; HCl

2) ZnO; H2SO4; Al(OH)3

3) H2SO4; CO2; Mg(OH)2

4) Na2CO3; H3PO4; Al2O3

Choose one correct answer from the proposed options.

**11.** **In the conversion series:**

**x1 x2**

**FeCl3 → Fe(OH)3 → Fe(NO3)3**

**compounds «Х1» и «Х2» can be respectively:**

  1) HNO3

2) N2O5

3) NaOH

4) Na2O

5) H2O

Put the numbers into the table under the corresponding letters:

|  |  |
| --- | --- |
| X1 | X2 |
|  |  |

Choose one correct answer from the proposed options.

**12.   Isobutane and 2-methylpropan are:**

  1) structural isomers

2) the same compound

3) homologues

4) geometrical isomers

Choose one correct answer from the proposed options.

**13.** **Establish a correspondence between the reactants indicated with letters and the products of the reactions indicated with numbers:**

Reactants Reaction products

А) СH3-СH=СH2+Сl2→ 1) 1,2-dibromopropane

B) СH3-СH2-СH2-OH+HСl→ 2) 1,2–dichloropropane

C) СH3-СH2-С≡СH+2HСl→ 3) 2,2-dichlorobutane

D) СH3-СH=СH2+Br2→ 4) 1-chloropropane

Put the selected numbers into the table under the corresponding letters.

|  |  |  |  |
| --- | --- | --- | --- |
| А | B | C | D |
|  |  |  |  |

**Решение.**

Из перечисленных веществ железо в одну стадию можно перевести в хлорид железа(III) при реакции с хлором (вещество № 2), далее его в одну стадию можно перевести в хлорид железа(II) по реакции с металлическим железом (вещество № 4).

Ответ: 24.

Ответ: 24

6225

24

Раздел кодификатора ФИПИ: [2.8 Взаимосвязь различных классов неорганических веществ](https://chem-ege.sdamgia.ru/search?keywords=1&cb=1&search=2.8%20Взаимосвязь%20различных%20классов%20неорганических%20веществ)

**Решение.**

Установите соответствие.

A) Метилэтиловый эфир — простой эфир https://ege.sdamgia.ru/formula/0a/0abbf6e09fc7dd9a6c740f124e41de2ep.png, формула № 2.

Б) Пропановая кислота — кислота https://ege.sdamgia.ru/formula/80/800765c6986ea5d416d7e3b3ba29b180p.png, формула № 1.

B) Пропаналь — альдегид https://ege.sdamgia.ru/formula/40/40d733dc9c6c1b122d063a41d6e8cb14p.png, формула № 3.

Ответ: 213.

Ответ: 213

8094

213

Источник: РЕШУ ЕГЭ

Раздел кодификатора ФИПИ: [3.3 Классификация органических веществ. Номенклатура органических веществ](https://chem-ege.sdamgia.ru/search?keywords=1&cb=1&search=3.3%20Классификация%20органических%20веществ.%20Номенклатура%20органических%20веществ)

**14. Establish a correspondence between the formulas of the organic compounds indicated with letters and their names indicated with numbers:**

Compound formulas Compound names

А) CH2=CH-CH=CH2 1) 2,2,3-trimethylbutane

B) CH2=С(CH3)-CH=CH2  2) butadiene-1,3

C) CH3-CH(CH3)-CH(CH3)-CH3  3) 2,3-dimethylbutane

D) CH3-C(CH3)2-CH(CH3)-CH3 4) 2-methylbutadiene-1,3

Put the selected numbers into the table under the corresponding letters.

|  |  |  |  |
| --- | --- | --- | --- |
| А | B | C | D |
|  |  |  |  |

**15. Which polymer is used in medicine as a dressing material?Решение.**

**Молекулярная формула 2-нитропропана — https://ege.sdamgia.ru/formula/a0/a004d98c07c1659dc51d66ad8645b995p.png.**

**Такой же состав имеют вещества: (1) https://ege.sdamgia.ru/formula/d3/d3ba3d76f038da8d10555b06aad89a37p.pngи (3) https://ege.sdamgia.ru/formula/4e/4ea1fa9cad3ff4d1270377d3d907d00fp.png.**

**Ответ: 13.**

**Ответ: 13|31**

**7346**

**13|31**

**Источник: РЕШУ ЕГЭ**

**Раздел кодификатора ФИПИ:** [**3.1 Теория строения органических соединений. Взаимное влияние атомов в молекулах**](https://chem-ege.sdamgia.ru/search?keywords=1&cb=1&search=3.1%20Теория%20строения%20органических%20соединений.%20Взаимное%20влияние%20атомов%20в%20молекулах)

1) polyvinylchloride

2) cellulose

3) polystyrene

4) teflon

Choose one correct answer from the proposed options.

**16. In a lab propane (C3H8) can be obtained by the reaction between sodium butanoate and the following compound:**

  1) HBr

2) NaOH

3) Na2CO3

4) H2SiO3

Choose one correct answer from the proposed options.

**17.** **In the conversion series:**

**Х1 Х2**

**propene → propanol-2 → 2-chloropropane**

**compounds «Х1» и «Х2» can be respectively**

  1) Cl2

2) NaOH

3) CH3Cl

4) H2O

5) HCl

Put the numbers into the table under the corresponding letters:

|  |  |
| --- | --- |
| X1 | X2 |
|  |  |

Choose one correct answer from the proposed options.

**18. Interaction between sulfa oxide (IV) and oxygen belongs to the following types of reactions:**

  1) addition, heterogenous

2) addition, endothermic

3) homogenous, catalytic

4) heteronenous, catalytic

Choose one correct answer from the proposed options.

**19.** The rate of the reaction of salt hydrolysis in a solution increases on**:**

  1) diluting the solution with water and heating

2) concentrating the solution and heating

3) diluting the solution with water and cooling

4) sedimenting the solute from the solution and heating

Choose one correct answer from the proposed options.

**20. If dynamic balance is achieved in a reversible process, then:**

1) the rate of a direct reaction is higher than that of a reverse reaction

2) the concentrations of the reactants are higher than the concentrations of the products

3) the rate of a direct reaction is the same as the rate of a reverse reaction

4) the concentrations of the reaction products are lower than the concentrations of the reactants.

Choose one correct answer from the proposed options.

**21. The following compound dissociates stepwise in a water solution:**

  1) Al2(SO4)3

2) H2SO3

3) C2H5COOH

4) NН4OH

Choose one correct answer from the proposed options.

**22. In contrast to propanol -1, glycerol reacts with:**

  1) copper hydroxide (II) and hydrogen chloride

2) copper hydroxide (II) and a base

3) sulfuric acid and sodium

4) sulfuric acid and hydrogen bromide

Choose one correct answer from the proposed options.

**23.** **Establish a correspondence between the formula of the compound indicated with a letter and the oxidation degree of a carbon in it indicated by a number:**

А) CH3Сl 1) -2

B) C2H6 2) -3

C) CCl4 3) 0

D) CH2Cl2  4) +3

5) +4

Put the selected numbers into the table under the corresponding letters.

|  |  |  |  |
| --- | --- | --- | --- |
| А | B | C | D |
|  |  |  |  |

**24.**  **Mass of oxygen required for complete combustion of 11.2 l (NC) of hydrogen sulfide is:**

  1) 32 g

2) 9,6 g

3) 24 g

4) 48 g

Choose one correct answer from the proposed options.

**25. 25 g of water were added to 75 g of 15 % salt solution. What is mass fraction of the salt in the final solution?**

  1) 11,25%

2) 11,5%

3) 15%

4) 10%

Choose one correct answer from the proposed options.

**26.** **A reaction between 18 g of a saturated monohydric alcohol and sodium metal results in the release of 3.36 l of gas. Determine a molecular formula of the alcohol.**

1) C3H7OH

2) C2H5OH

3) CH3OH

4) C4H9OH

Choose one correct answer from the proposed options.

**27. Complete combustion of 0.9 of a saturated primary amine results in the release of 0.224 l of nitrogen (NC). Determine a molecular formula of this amine.**

1) CH3NH2

2) C4H9NH2

3) C3H7NH2

4) C2H5NH2

Choose one correct answer from the proposed options.

***KEYS***

***Examination Sample Paper***

|  |  |  |  |
| --- | --- | --- | --- |
| **№ task** | **Answer** | **№ task** | **Answer** |
|  | 2 | 16. | 2 |
|  | 1 | 17. | 4,5 |
|  | 2 | 18. | 3 |
|  | 2 | 19. | 1 |
|  | 2 | 20. | 3 |
|  | 3 | 21. | 2 |
|  | 1 | 22. | 1 |
|  | 3 | 23. | 1,2,5,3 |
|  | 1,3,4,2 | 24. | 3 |
|  | 2 | 25. | 1 |
|  | 3,1 | 26. | 1 |
|  | 2 | 27. | 4 |
|  | 2,4,3,1 |  |  |
|  | 2,4,3,1 |  |  |
|  | 2 |  |  |

For the correct answer to the tasks:

from 1 to 10 – 2 points;

from 11 to 20 – 3 points;

from 21 to 24 – 4 points;

from 25 to 26 – 7 points;

from 27 to 28 – 10 points.

Total points are 100.

Mark «excellent» - 75-100 points;

Mark «good» - 60-75 points;

Mark «satisfactory» - 40-60 points;

Mark «poor» - less than 40 points.