



**EXAMINATION TEST
"CHEMISTRY"**

DEMONSTRATION VARIANT

PART 1.

Task: Choose one correct answer from the suggested ones.

- Which element is the most active metal of this group?
 - Li
 - Na
 - K
 - F
- Which element has seven electrons in its outer energy level?
 - Kr
 - I
 - As
 - P
- Choose the element that has a highest oxidation state of +4.
 - Sr
 - F
 - I
 - Sn
- Choose substance in which oxygen forms ionic bonds.
 - ozone
 - carbon dioxide
 - copper oxide
 - water
- Sulfur dioxide is the anhydride of
 - hydrosulfuric acid
 - sulfurous acid
 - sulfuric acid
 - hyposulfurous acid
- In this equation: $\text{Al}(\text{OH})_3 + \text{H}_2\text{SO}_4 \rightarrow \text{Al}_2(\text{SO}_4)_3 + \text{H}_2\text{O}$, the whole-number coefficients of the balanced equation are
 - 1, 3, 1, 2
 - 2, 3, 2, 6
 - 2, 3, 1, 6

- d) 1, 3, 1, 6
7. Choose pair of substances with which sulfur reacts.
a) Fe, Al
b) H₂, HCl
c) Cl₂, NaCl
d) HCl, NaOH
8. What substances can react with nitrogen
a) KNO₃, CO₂, Au
b) Cl₂, KOH, SiO₂
c) Ca, O₂, H₂
d) HCl, Fe₂O₃, S
9. What substances can react with bromine?
a) H₂SO₄, KOH, H₂
b) KOH, Cu, SO₂
c) Li, O₂, H₂
d) O₂, NaOH, Mg
10. What substances can react with SO₂?
a) H₂SO₄, CO, Al
b) NaOH, CaO, H₂S
c) HNO₃, K₂SO₄, Na₂CO₃
d) AgNO₃, KMnO₄, Zn
11. When most fuels burn, the products include carbon dioxide and
a) hydrocarbons
b) hydrogen
c) water
d) hydrogen peroxide
12. What class of organic compounds does toluene belong to?
a) hydrocarbons
b) monohydric alcohols
c) polyhydric alcohols
d) ketones
13. You can get butane in one stage from
a) 1-butanol
b) butanoic acid
c) 1-butene
d) 2-butanol
14. What product is produced by the interaction of toluene and chlorine in the UV light
a) C₆H₅Cl
b) C₂H₅Cl
c) C₆H₆Cl₆
d) C₆H₅CH₂Cl
15. Formic acid react with
a) propanol
b) sodium chloride

- c) sodium hydrosulfate
- d) methane

16. Aminobutanoic acid react with
- a) silica
 - b) 1,3-butadiene
 - c) hydrochloric acid
 - d) sodium sulfate
17. What product is formed by the interaction of propionic acid and sodium
- a) 1-propanol
 - b) 2-propanol
 - c) propanone
 - d) sodium propionate
18. With what substance does toluene react by the substitution mechanism?
- a) Br₂
 - b) HBr
 - c) H₂O
 - d) H₂
19. Substitution reaction is interaction of HCl and
- a) C₂H₄
 - b) Zn
 - c) CuO
 - d) AgNO₃
20. What reaction equation corresponds to a reduction half reaction
- $$S^{+6} + 2e^- \rightarrow S^{+4}$$
- a) Hg + S = HgS
 - b) Cu + 2H₂SO₄ = CuSO₄ + SO₂ + 2H₂O
 - c) H₂SO₄ + 8HI = 4I₂ + H₂S + 4H₂O
 - d) SO₂ + H₂O₂ = H₂SO₄
21. Calculate the coefficient before the formula of reducing agent in the reaction
- $$Cu + HNO_3 \rightarrow Cu(NO_3)_2 + NO_2 + H_2O$$
- a) 2
 - b) 6
 - c) 4
 - d) 1
22. For the following reaction:
- $$N_2O_4(g) \leftrightarrow 2NO_2(g),$$
- the K_{eq} expression is
- a) $K_{eq} = \frac{[N_2O_4]}{[NO_2]}$
 - b) $K_{eq} = \frac{[N_2O_4]}{[NO_2]^2}$
 - c) $K_{eq} = \frac{[NO_2]}{[N_2O_4]}$
 - d) $K_{eq} = \frac{[NO_2]^2}{[N_2O_4]}$

23. What effect do not affects the rate of chemical reaction
 $2\text{NH}_3(\text{g}) \leftrightarrow \text{N}_2(\text{g}) + 3\text{H}_2(\text{g})$
 a) the change in the concentration of ammonia
 b) pressure change
 c) change in the concentration of hydrogen
 d) temperature change.
24. In which direction does the equilibrium shift with increasing pressure in the system.
 $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \leftrightarrow 2\text{NH}_3(\text{g})$
 a) is shifted towards the reaction products
 b) is shifted towards the original substances
 c) there is no equilibrium shift
25. In which direction does the equilibrium shift with reducing the volume (compression) of the system at a constant temperature
 $\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \leftrightarrow 2\text{NO}(\text{g})$
 a) is shifted towards the reaction products
 b) is shifted towards the original substances
 c) there is no equilibrium shift
26. In the electrolysis of Na_2S solution, the substance liberated at the anode is
 a) SO_2
 b) S
 c) O_2
 d) H_2
27. In the electrolysis of $\text{Hg}(\text{NO}_3)_2$ solution, the substance liberated at the cathode is
 a) NO_2
 b) Hg
 c) O_2
 d) H_2
28. In the electrolysis of NaNO_3 solution, the substance liberated at the cathode is
 a) NO_2
 b) Na
 c) O_2
 d) H_2
29. What is the relation to hydrolysis of iron (II) sulfate?
 a) Hydrolyzed by cation
 b) Hydrolyzed by anion
 c) Hydrolyzed both by cation and anion
 d) Not hydrolyzed
30. When placed into water, ZnSO_4 will test as an ... solution
 a) acid
 b) base
 c) neutral
31. In a proper laboratory setup for collecting a gas by water displacement, which of these gases could NOT be collected over H_2O because of its solubility?

- a) CO₂
- b) NO
- c) O₂
- d) NH₃

32. Where is ethylene used in industry?
- a) getting nylon
 - b) as fuel
 - c) obtaining rubber
 - d) getting plastics
33. How can a mixture of iron and magnesium be separated?
- a) by fractional distillation
 - b) with a magnet
 - c) by decantation
 - d) by cooling
34. What is the source of polypropylene?
- a) air
 - b) halite
 - c) propylene
 - d) flue gases
35. A student filled a steam-jacketed eudiometer with 32 milliliters of oxygen and 4.0 milliliters of hydrogen over mercury. How much of which gas would be left uncombined after the mixture was sparked?
- a) None of either
 - b) 3.0 mL H₂
 - c) 24 mL O₂
 - d) 30 mL O₂

PART 2.

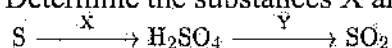
Task: Complete the phrase (word, word combination, or number).

1. Several pieces of metal Y were added to a test tube with a solution of salt X. As a result of the reaction, dissolution of pieces of metal Y and the release of another metal were observed. From the proposed list, select substances X and Y, which may enter into the described reaction.
- a) Au
 - b) KCl
 - c) AgNO₃
 - d) Fe
 - e) NaOH

Write down the right numbers (first X, then Y)

Answer: _____

2. Determine the substances X and Y, indicated in the scheme.



- a) O₂
- b) H₂O
- c) Na₂SO₃
- d) HNO₃
- e) Cu(OH)₂

Write down the right numbers (first X, then Y)

Answer: _____

3. Identify the substances X and Y shown in the scheme
 $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH} \xrightarrow{\text{X}} \text{CH}_3\text{CH}=\text{CH}_2 \xrightarrow{\text{Y}} \text{CH}_3\text{COOH}$

- a) O_2
- b) H_2SO_4 (concentrated)
- c) KMnO_4 (H^+)
- d) KOH
- e) H_2O

Write down the right numbers (first X, then Y)

Answer: _____

4. $2\text{Na}(\text{s}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{NaCl}(\text{s}) + 822 \text{ kJ}$
How much heat (kJ) is released by the above reaction if 0.5 mole of sodium reacts completely with chlorine?
Answer: _____
5. How many moles of CaO are needed to react with an excess of water to form 370 grams of calcium hydroxide?
Answer: _____
6. What is the percentage composition of calcium in calcium hydroxide, $\text{Ca}(\text{OH})_2$? (1 mol = 74 g)
Answer: _____
7. As a result of the reaction
 $\text{SO}_3 + \text{H}_2\text{O} = \text{H}_2\text{SO}_4 + 88\text{kJ}$,
264 kJ of heat was released. Calculate the mass (g) of the resulting sulfuric acid.
Answer: _____
8. There is a solution of NaOH . The molar concentration of the solution = 2 mol/l. The density of the solution = 1.1 g/cm^3 . Mass fraction of NaOH = _____%
9. Determine the volume that will occupy under normal condition a gas mixture containing 1.4 g of hydrogen and 5.6 g of nitrogen
Answer: _____
10. Establish the empirical formula of organic matter, which includes carbon, hydrogen, and sulfur, if 5.28 g of carbon dioxide, 3.24 g of water and 3.84 g of sulfur was produced during combustion.
Answer: _____

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