

1. Write the formulas of following molecules: (a) calcium cyanide, (b) sodium peroxide and name the formulas: (c) HClO, (d) $\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$
2. Write the name of compound $[\text{Cr}(\text{H}_2\text{O})_5\text{Cl}]\text{Cl}_2$ and determine following: the central atom, ligands and coordination number.
3. Draw the plot of the dependence of the rate of chemical reaction on the concentration of the reactants for the reactions of the 1st order.
4. Give the equilibrium constant for reaction: $\text{O}_3 \rightleftharpoons \text{O}_2$.
5. Write the both: the components of phosphate buffer system and Henderson-Hasselbalch equation for this buffer system.
6. Approximate pH of the solution after dissolution of KCN in water. Explain by chemical reaction.
7. Write Nernst equation for the redox system $\text{Cu}^{2+}/\text{Cu}^+$.
8. Write (by the formula) the reaction between methanol and acetic acid and give the name of the products.
9. Write the formulas of creatine and salicylic acid.
10. Give the structure and the name of compound that is formed after reaction between malonic acid and urea.
11. Using the Haworth formula of mannose explain term mutarotation.
12. Write the Haworth formulas of glucose 6-phosphate and D-galactosamine.
13. Give at least two examples (with structures) of glycosaminoglycans
14. Describe the inulin and chitin (the linkage and monosaccharide composition).
15. Give the structure of at least 2 essential fatty acids. Specify, if they are ω -3 or ω -6 fatty acids.
16. Write the formula of phosphatidylethanolamine and sign the hydrophobic and hydrophilic part of the molecule.
17. Write the structure of eicosanoids precursor. Explain biomedical importance of eicosanoids.
18. Write the formula and name of two sulphur containing amino acids.
19. Draw the structure of tripeptide Phe-Asp-Ala. What is the name of it?
20. Name at least two different examples of hemoprotein.
21. Write the structure of nitrogenous base that is complementary to guanine.
22. Give the structures of at least 2 pyrimidine bases present in RNA molecule.
23. Draw the general scheme of tRNA. Specify the nucleotide sequence of 3' - end.
24. Write the following: the name of corresponding class, function and 1 example of enzyme for the 1st class of enzymes.
25. The enzyme *E* has $K_m=3 \cdot 10^{-1}$ mol/L to the substrate S_1 and $K_m=6 \cdot 10^{-5}$ mol/L to substrate S_2 . Decide to which substrate the enzyme has higher affinity. Explain your decision.
26. Calculate the concentration of NaOH in mol/l if for the titration of 15 ml of sodium hydroxide solution was used 7.5 ml of hydrochloric acid with a concentration of 0.2 mol/l.
27. Calculate pH and pOH of the solution that contain 15 g HCl and 25 g HNO₃ in total volume of 5.4 L.
28. Calculate the molar concentration of 28 % KCl solution with density of $\rho = 1.12 \text{ g} \cdot \text{cm}^{-3}$.
29. Calculate the molar ratio of component units of bicarbonate buffer if pH=7.38 and $\text{pK}_A=6.1$.
30. Find the stoichiometric coefficients for the reaction: $\text{Au} + \text{H}_2\text{SeO}_4 \rightarrow \text{Au}_2(\text{SeO}_4)_3 + \text{H}_2\text{SeO}_3 + \text{H}_2\text{O}$, and write half reactions of oxidation and reduction.