**Variant № 1**

1. Find ionic equation of water.
   **A)** $\frac{[H^+] \cdot [OH^-]}{[H_2O]} = 1{,}8 \cdot 10^{-16}$ **B)** $[H_3O^+]\,[OH^-] = 10^{-14}$
   **C)** $-\lg[H^+] \cdot [-\lg[OH^-] = 14$ **D)** $pH + pOH = 14$

2. The pOH value of blood varies in limits:
   **A)** 7,36 – 7,40 **B)** 6,64 – 6.40
   **C)** $10^{-7,36} - 10^{-7,40}$ **D)** 1 – 1,5 .

3. Buffer solutions, consisting of weak acid & its anion, usually have stable pH value equal to:
   **A)** from 1 to 3 **B)** from 3 to 7
   **C)** from 7 to 10 **D)** from 10 to 14

4. The pH of the buffer consisting of the weak acid & its anion depends from:
   **A)** the value of constancy of acidity **B)** the ratio of acid & salt concentrations
   **C)** the acid dissociations degrees **D)** the absolute concentrations of buffer components

5. Buffer capacity (**B)** – is a property of buffer system:
   **A)** to support the constancy of pH during buffers dilution
   **B)** to contradict the pH change during the increase of buffers components concentrations
   **C)** to contradict pH change during the addition of low quantities of acid or base
   **D)** to support constancy of the pH, independently from the pOH value

6. Buffer capacity of acidic buffer formed by the weak acid increases during the:
   **A)** combined increase of acids concentration & salts concentration decrease
   **B)** combined decrease of acids concentration & salts concentration increase
   **C)** decrease of acids concentration
   **D)** increase of salt concentration

7. Buffer capacity of hydrocarbonate buffer by acid depends of:
   **A)** $NaHCO_3$ concentration **B)** $H_2CO_3$ concentration
   **C)** the pH value of a buffer **D)** the quantity of added acid

8. Alkaline reserve of blood is developed:
   **A)** by the partial pressure of free $CO_2$ in blood plasma
   **B)** by the volume of $CO_2$ chemically fixed with hemoglobin in blood cells
   **C)** by the volume of $CO_2$ chemically fixed with bicarbonate ion in blood plasma
   **D)** by the volume of free $CO_2$ in the alveolar air

9. Alkaline reserve of blood normally equals:
   **A)** to 50-70 % by volume **B)** to 53,3 gPa
   **C)** to 8-10 mmol/L **D)** to 7,36-7,40

10. Acidic-basic equilibrium in blood cells is performed by buffer systems:
    **A)** hydrocarbonate **B)** acetate
    **C)** phosphate **D)** hemoglobin

11. Complex compounds are…
    **A)** compounds of higher order got by the reactions of polymerization or polycondensation;
    **B)** compounds of higher order got by the donor-acceptor mechanism;
    **C)** compounds of lower order & in centers of its lattice we can find cations & anions;

**D)** compounds of higher order containing complex particles (complex ions), saving their stability while melted or dissolved in the centers of its lattice.

12. From the given compounds find coordinate complexes:
**A)** $CCl_4$; **B)** $[AgCl_2]^-$; **C)** $PtCl_4$; **D)** $[CuCl_4]^{2-}$.

13. From the given complexes find neutral:
**A)** $[Cr(NH_2\text{-}CH_2\text{-}CH_2\text{-}NH_2)_3]Cl_3$; **B)** $[Pt(H_2O)(NH_3)_2OH]Cl$;
**C)** $[Co(NH_3)_3Cl_3]$; **D)** $[Ni(CO)_4]$.

14. For the complex compound $[Cu(NH_2\text{-}CH_2\text{-}CH_2\text{-}NH_2)(CN)_2]$ the coordinate number equals to :
**A)** 2; **B)** 3; **C)** 4; **D)** 6.

15. Denticity of ligand can be found by:
**A)** the charge of central complex-forming ion;
**B)** the quantity of donor atoms in ligand taking part in complex formation;
**C)** the quantity of coordinate bonds connecting ligands with the complex-forming atom;
**D)** the quantity of ligands, coordinated around the complex-forming atom;

16. Chelating effect in complex formation can be explained by:
**A)** the big size of polidentate ligand in complex compound;
**B)** the formation of few bonds by ligand & complex forming atom;
**C)** the high molecular mass of ligand;
**D)** the formation of ring like structure between the ligand & complex-forming atom

17. Define the orbitals on which the electronic sublevels of central complex-forming zinc ion are hybridized for the formation of bonds with $Cl^-$ ions in the complex ion $[ZnCl_4]^{2-}$.
**A)** 3d, 4s; **B)** 3d, 4s, 4p; **C)** 4s, 4p; **D)** 4s, 4p, 4d.

18. By the nature of complex ligands we can find such types of complexes:
**A)** aquacomplexes; **B)** acidocomplexes;
**C)** chelate complexes; **D)** aliphatic complexes;

19. The highest complexforming ability have:
**A)** polycharge cations of d-elements; **B)** monocharge cations of s-elements;
**C)** neutral metal atoms; **D)** monocharge anions.

20. Find the right name for the complex compound $[Co(NH_3)_4Br_2]Cl$:
**A)** chloride of tetraamino dibromo cobalt (III);
**B)** chloride of dibromo tetraamino cobalt (III);
**C)** tetraamino dibromo cobaltate (III) chloride;
**D)** dibromo tetraamino cobalt (III) chloride;

21. Systems in which substance of dispersed phase is situated in separate molecular state are called:
**A)** true (crystalline)solutions; **B)** molecular – dispersed systems;
**C)** colloidal – dispersed systems; **D)** coarsely-dispersed systems.

22. Disperse systems in which a dispersed phase & dispersion medium are liquid are called:
**A)** aerosols; **B)** suspensions;
**C)** emulsions; **D)** foams.

23. To the dispersion methods of colloidal particles production we can add:
**A)** peptization method;
**B)** solvents substitution method;
**C)** mechanical crushing with the help of ball & colloidal mills;
**D)** ultrasonic disintegration;

24. Kinetic stability of sols is performed by:
**A)** the Brownian motion of colloidal particles;
**B)** the diffusion of colloidal particles;
**C)** the activity of stabilizers;
**D)** the action of gravity forces on colloidal particle;

25. In micelle formed by the reaction between the $BaCl_2$ & $Na_2SO_{4\,(excess)}$, potencial determinating ions are:
**A)** $Ba^{2+}$ **B)** $Cl^-$
**C)** $Na^+$ **D)** $SO_4^{2-}$.

26. Micelle, formed by the NaBr & $AgF_{\,(excess)}$ mixing has a formula:
**A)** $\{m[NaBr]nF^-\}nAg^+$; **B)** $\{m[AgBr]nAg(n-x)F^-\}xF^-$;
**C)** $\{m[AgBr]nF^-(n-x)Ag^+\}xAg^+$ **D)** $\{m[AgF]nNa^+\}nBr^-$.

27. In diffuse layer of colloidal particle we can find:
**A)** potential determinating ions; **B)** counterions;
**C)** molecules of solvent & potential determining ions; **D)** only molecules of solvent.

28. Coagulating activity for the micelle $\{m[AlPO_4]_nPO_4^{3-}(3n-x)Na^+\}xNa^+$ will show such ions:
**A)** $Cl^-$; **B)** $K^+$;
**C)** $SO_4^{2-}$; **D)** $Ca^{2+}$.

29. The common properties of polymers & colloidal solutions are:
**A)** the presence of big surface area between the dispersion medium & dispersed phase;
**B)** the particles of dispersed phase have size $10^{-7}$m–$10^{-9}$m;
**C)** they have high thermodynamic instability;
**D)** the particles of dispersed phase can not pass through the semipermeable membrane.

30. The formation of solution from the solid polymer is called:
**A)** limited swelling; **B)** unlimited swelling;
**C)** coagulation; **D)** peptization;

31. The maximal value of orbital quantum electron number (*l*) on fourth energy level is:
**A)** 1; **B)** 2; **C)** 3; **D)** 4.

32. Electrons with orbital quantum number equal to 0 ($l = 0$) are called:
**A)** s-electrons; **B)** p- electrons; **C)** d- electrons; **D)** f- electrons;

33. Which atoms (in stationary condition) have electron with given quantum numbers: n = 3, $l$=1, m=0:
**A)** Na; **B)** P; **C)** Mg; **D)** Ne?

34. The quantity of unpaired electrons in the Iron atom in non energized condition equals to:
**A)** 3; **B)** 4; **C)** 5; **D)** 6.

35. The order of bond in the molecular $H_2^+$ ion equals to:
**A)** 1; **B)** 2; **C)** 0,5; **D)** 0, 25.

36. Which particles contain unpaired electrons?
**A)** $N_2$; **B)** $O_2$; **C)** $F_2$; **D)** $C_2$?

37. The charge of atom equals to:
**A)** zero; **B)** periodic table number of element; **C)** quantity of electrons; **D)** nucleus charge;

38. Mark the symbol of chemical element which atom has (in basic condition) highest quantity of half filled orbitals:
**A)** Ar; **B)** S; **C)** Fe; **D)** Cr.

39. Find incorrect statement. In the molecule of nitrogen:

**A)** multiplicity of bonds equal to 3; **B)** chemical bond is very strong;
**C)** 1σ- & 2 π-bonds; **D)** chemical charge is covalently polar.

40. Which atom from given has lowest atomic radius:

**A)** H; **B)** He; **C)** Li; **D)** F?