KURDISTAN REGION GOVERNMENT -IRAQ IN THE NAME OF ALLAH
MINISTRY OF EDUCATION
HIGH COMMITTEE OF THE GENERAL EXAMINATION
General Examinations for Preparatory Stage
Study year (2022-2023) (Grade twelve scientific)

Subject : Chemistry
Time:3.30 hours
وەڵامی نموونەیی
1st Attempt

Fingerprint

Choose the correct answer for the following questions (two marks for each question)

1. Which of the following solutions has the highest osmotic pressure?
A. 0.4*m* glucose **B**. 0.2*m* sucrose **C**. 0.3*m* glucose **D**. 0.1*m* sucrose

2. The boiling point of an aqueous solution of glucose is 100.102°C, the expected boiling point for which of the following solutions is 100.306°C, with the same concentration? (K_b=0.51°C/*m*)
A. KNO_3 **B**.$CaCl_2$ **C**. $AlCl_3$ **D**. NH_4Cl

3. Is a compound that does not ionize in water:-
A. CH_3NH_2 **B**. NaOH **C**. NH_3 **D**. HF

4. Lewis acid is an atom, ion, or molecule form a covalent bond by:-
A. accept an electron pair **B**. donate an electron pair **C**. accept proton **D**. donate proton

5. When an aqueous solutions of barium chloride and potassium sulphide combined, which of the following ions do not appear in the net ionic equation?
A. $K^+$and S^{2-} **B**. $Ba^{2+}$and S^{2-} **C**. $K^+$and Cl^- **D**. $Ba^{2+}$and Cl^-

6. When a quantity of $Al_2(SO_4)_3$ is dissolved in water, 0.4 mole of aluminium ions are formed, how many moles of aluminium sulfate are dissolved? **A**. 0.2 **B**. 0.4 **C**. 0.6 **D**. 0.8

7. One of the following compounds is not very soluble in water, it cannot produce strongly alkaline solution: **A**. NH_3 **B**. NaOH **C**. $Cu(OH)_2$ **D**. CH_3OH

8. Which of the following statements is true for dissolving KNO_3 in water?
A. randomness increases **B**. randomness decreases
C. pH does not change **D**. both(A and C)

9. Which of the following solutions has highest pOH value with the same concentration?
A. $Ca(OH)_2$ **B**. KCl **C**. KNO_2 **D**. NH_4Cl

10. The pH of $Ca(OH)_2$ solution is 9.3, what is the concentration of $Ca(OH)_2$ solution?
A. $1x10^{-5}$M **B**. $2x10^{-5}$M **C**. $5x10^{-10}$M **D**. $5x10^{-5}$M

11. The volume of 0.2M of sulfuric acid is required to titrate with 0.5mol of sodium hydroxide is:-
A. 2.5L **B**. 0.8L **C**. 1.25L **D**. 1.25mL

12. When a reaction is endothermic and leads to decrease randomness, the reaction is:-
A. always spontaneous **B**. spontaneous at high temperature
C. never spontaneous **D**. spontaneous at low temperature

13. The suitable indicator for titration potassium hydroxide with ethanoic acid is :
A. methyl red (pH= 4.4-6.2) **B**. methyl orange(pH= 3.1-4.4)
C. phenolphthalein(pH= 8.0-10.0) **D**. not determined

14. 0.25kJ of energy is added to 10g of a material, the temperature changed 50K, the specific heat is equal:- **A**. 0.0005J/(mol.K) **B**. 0.5J/(mol.K) **C**. 0.5J/(g.K) **D**. 0.5kJ/(g.K)

15. Hydrogen combines vigorously with chlorine, but it reacts weakly with nitrogen , under the same condition, the factor affecting the rate of reaction is:-
A. surface area of reactants **B**. nature of reactants and chemical bonds
C. concentration of reactants **D**. presence of catalysts

16. A reaction has ΔG= -834.3kJ/mol and ΔS= -38.5J/(mol.K), ΔH for the reaction at 448K is equal:
A. 851.5kJ/mol **B**. -851.5kJ/mol **C**. -817kJ/mol **D**. 817kJ/mol

17. In this reaction: $NH_3(g) + H_2O(l) \rightleftarrows NH_4^+(aq) + OH^-(aq)$, which of the following is correct?
A. water is a Bronsted-Lowry acid **B**. H_2O and H_3O^+ are conjugate acid-base pair
C. the reverse reaction is more favorable **D**. both (A and C)

18. Is a poly atomic ion, the oxidation number of sulfur is +4 :-
A. SO_4^{2-} **B**. SO_2 **C**. SO_3^{2-} **D**. both(B and C)

19. In this reaction: $2Fe_2O_3(s) + 3C(s) + 467.9kJ \longrightarrow 4Fe(s) + 3CO_2(g)$, calculate the standard enthalpy of formation for Fe_2O_3 , if the standard enthalpy of formation for CO_2 is -393.5kJ/mol
A. -1648.4kJ/mol **B**. - 824.2kJ/mol **C**. -712.6kJ/mol **D**. -356.3kJ/mol

20. By using a catalyst in a reaction the forward activation energy is decreased by an amount, which of the following is correct?
A. the change of enthalpy decreases by the same value
B. the activated complex energy decreases by the same value
C. the reverse activation energy decreases by the same value
D. both(B and C) are correct

21. Which of the following compounds is a structural isomers of pentane according IUPAC system?
A. 2-methyl pentane **B**. 1-methyl butane
C. 2,2-dimethyl propane **D**. both (B and C)

22. The anode electrode in a car battery is:-
A. Pb **B**. $PbSO_4$ **C**. PbO_2 **D**. H_2SO_4

23. Is a process deposits metal onto a surface:-
A. dissociation **B**. electro plating **C**. disproportionation **D**. oxidation

24. The following reaction: $A + 2B \longrightarrow C$, is found to occur in the one - step mechanism, by using the data in the adjacent table, the rate of the reaction in the second experiment is :
A. $1.6x10^{-4}$ **B**. $1.6x10^{-3}$ **C**. $4x10^{-4}$ **D**. $8x10^{-4}$

Experiment	[A]	[B]	Rate M/s
1	0.2	0.2	2.0×10^{-4}
2	0.4	0.4	?

25. In this reaction: $NO_2+CO \longrightarrow NO+CO_2$, if the reaction of fast step is: $NO_3+CO \longrightarrow NO_2+CO_2$, by what factor does the rate increase if [CO] doubled?
A. 2 **B**. 4 **C**. 8 **D**. the rate of reaction does not changed

26. Neutralization is: **A**. amphoteric acts of matter
B. the reaction H_3O^+ ions with OH^- ions to produce salt
C. the reaction H_3O^+ ions with OH^- ions to produce water
D. the reaction hydrogen gas and oxygen gas to produce water

27. By adding KCN to HCN solution:- **A**. $[CN^-]$ increases **B**. pH decreases **C**. ionization of HCN decreases **D**. both (A and C)

28. The aqueous solution of NH_4CH_3COO is neutral because :-

A. both its ions do not hydrolysis **B**. the salt is formed from strong acid and strong base **C**. both its ions are hydrolyse equally **D**. both(A and B)

29. For the following gaseous reaction: $2HI \rightleftharpoons H_2+I_2$, at equilibrium it is found that [HI]=0.24M ,$[H_2]=[I_2]=0.12M$, the equilibrium constant for the reverse reaction is equal:-

A. 0.25 **B**. 4 **C**. 2 **D**. 0.5

30. When 25.0 mL of $5x10^{-5}M$ $Pb(NO_3)_2$ is combined with 25.0 mL of $4x10^{-5}M$ Na_2SO_4 , which of the following is net ionic equation through K_{sp} calculation (K_{sp} for $PbSO_4=1.6x10^{-8}$)

A. $Pb^{2+}(aq)+SO_4^{2-}(aq) \longrightarrow PbSO_4(s)$ **B**. $Pb^{2+}(aq)+2NO_3^-(aq) \longrightarrow Pb(NO_3)_2(s)$

C. $PbSO_4(s) \longrightarrow Pb^{2+}(aq)+SO_4^{2-}(aq)$ **D**. none of them

31. Br_2 is oxidizing agent, displaces……ions.

A. fluoride **B**. chloride **C**. iodide **D**. chloride and iodide

32. Is an ion that does not act as a Bronsted-Lowry acid:-

A. NH_4^+ **B**. HCO_3^- **C**. $HCOO^-$ **D**. all of them

33. In the following gaseous equilibrium system: $2SO_2+O_2 \rightleftharpoons 2SO_3$ +energy , which of the following changes are increase amount of SO_3?

A. increased temperature **B**. decreased system volume **C**. addition Helium gas **D**. all of them

34. Which of the following is a monomer of natural rubber?

A. isoprene **B**. neoprene **C**. hexanediamine **D**. 1,3-butadiene

35. The following half-reaction: ($O_2(g)+4e^-+2H_2O(l) \longrightarrow 4OH^-(aq)$) occurs at cathode of:-

A. fuel cell **B**. corrosion of iron process **C**. electrolysis of water cell **D**. both(A and B)

36. It is used in biology laboratories as a preservative for dead animals:

A. formaldehyde **B**. benzoic acid **C**. phosphoric acid **D**. ester

37. The boiling point of ethanol is lower than the boiling point of:

A. dimethyl ether **B**. propane **C**. methanol **D**. 1,2-ethanediol

38. An allotrope of carbon is a soft, black and conductor of electricity:-

A. diamond **B**. graphite **C**. fullerene **D**. carbon-14

39. When a zinc strip is in contact with a copper (II) sulfate solution:

A. zinc is oxidized **B**. Copper is precipitate in the solution **C**. energy is released as heat **D**. all of them

40. In a reversible reaction, when the activation energy for exothermic change with activation energy for endothermic change is compare, which of the following is correct?

A. the activation energy of endothermic change is greater by the value of ΔH

B. the activation energy of exothermic change is greater by the value of ΔH

C. the activation energy of exothermic change and endothermic change is equal

D. none of them

41. In which of the following reaction the ΔH_f^0 value of product is equal to ΔH^0 of reaction?

A. $N_2+2O_2 \longrightarrow 2NO_2$ **B**. $CO+\frac{1}{2}O_2 \longrightarrow CO_2$

C. $SO_3+H_2O \longrightarrow H_2SO_4$ **D**. $\frac{1}{2}H_2+\frac{1}{2}Cl_2 \longrightarrow HCl$

42. This reaction: $Cl_2(g)+2Fe^{2+}(aq) \longrightarrow 2Fe^{3+}(aq)+2Cl^-(aq)$, is:-

A. balanced for charge and mass **B**. balanced for charge but not balanced for mass **C**. not balanced for charge and mass **D**. balanced for mass but not balanced for charge

43. The following reaction: $2Pb(NO_3)_2 \longrightarrow 2PbO+4NO_2+O_2$, is:

A. redox reaction, the lead is reduced **B**. not redox reaction **C**. redox reaction, the nitrogen is reduced **D**. disproportionation

44. The hybridization type of cycloalkane is:-

A. SP^2 **B**. SP^3 **C**. SP **D**. SP and SP^2

45. Which of the following compound may be alkyne?

A. C_4H_8 **B**. C_7H_{16} **C**. C_6H_{10} **D**. C_7H_8

46. One of the following is a type of substitution reaction:

A. $CH_3\text{-}Cl+Cl_2 \xrightarrow{light} CH_2Cl_2+HCl$ **B**. $CH_2=CH_2+Cl_2 \longrightarrow CH_2Cl\text{-}CH_2Cl$

C. $CH_3\text{-}CH_2\text{-}OH \xrightarrow{H_2SO_4} CH_2=CH_2+H_2O$ **D**. $CH\equiv CH+2HCl \longrightarrow CH_2Cl\text{-}CH_2Cl$

47. The molecular formula for 3-ethyl-4-methylhexane is:

A. C_8H_{18} **B**. C_9H_{20} **C**. C_9H_{18} **D**. $CH_3CH_2\underset{\displaystyle CH_3}{\overset{\displaystyle CH_2\text{-}CH_3}{\underset{|}{\overset{|}{C}}}}HCHCH_2CH_3$

48. The name of this compound: $CH_3\text{-}CH_2\text{-}NH\text{-}CH_3$, is:

A. methyl ethyl amine **B**. ethyl methyl ammonia **C**. ethyl methyl amine **D**. dimethyl amine

49. In which of the following containers, can a solution of $Sn(NO_3)_2$ be stored? if the standard reduction potential for each Sn^{2+},Zn^{2+},Al^{3+},Cu^{2+},Ni^{2+} respectively is equal to (-0.14, -0.76, -1.66, 0.34,-0.23) volt? **A**. Ni **B**. Cu **C**. Zn **D**. Al

50. The overall electrochemical reaction that occurs spontaneously for a cell consisting of the half-cell:MnO_2/Mn^{2+} and Cr^{3+}/Cr is: (E^0_{reduce} Cr^{3+}/Cr= - 0.74V, E^0_{reduce} MnO_2/Mn^{2+}=1.22V)

A. $3MnO_2+12H^++2Cr \longrightarrow 3Mn^{2+}+6H_2O+2Cr^{3+}$ **B**. $3MnO_2+6H^++2Cr \longrightarrow 3Mn^{2+}+3H_2O+2Cr^{3+}$

C. $MnO_2+4H^++Cr \longrightarrow Mn^{2+}+2H_2O+Cr^{3+}+1e^-$ **D**. $2Cr^{3+}+6H_2O+3Mn^{2+} \longrightarrow 3MnO_2+12H^++2Cr$