Kurdistan Region – Iraq 0001 In the Name of Allah Name: _____

High Committee for General Examination Subject: Chemistry Time: 3:30 Hours A

General exams for preparatory stage For the Academic year (2020-2021) Second attempt 91285

SN: 6000081

Answer the following questions : (two marks for each right choice)

1. *A solution made from ethanol ,C_2H_5OH,and water is 1.76m in ethanol .How many moles of ethanol are contained per 250g of water?*

A. 0.142mol **B.** 0.44mol **C.** 20.24mol **D.** 7.04mol

2. *Which one of the following statements is incorrect?*

A. Many solids dissolve more quickly in a cold solvent than in warm solvent.

B. Gases are generally more soluble in water at low temperature.

C. Aqueous solution is a mixture containing the solute soluble in water as a solvent.

D. The effect of stirring is similar to that of crushing a solid – contact between the solvent and the solute surface is increased.

3. *The boiling point of a solution is higher than that of a pure solvent because :-*

A. Vapor-pressure lowering **B.** Freezing- point heightening

C. Vapor-pressure heightening **D.** none of them

4. *A substance that can react as an acid or a base :*

A. SO_4^{2-} **B.** HSO_3^- **C.** CH_3COO^- **D.** NH_4^+

5. *Which of the following solutions with the same concentrations has lower $[H_3O^+]$?*

A. HCl **B.** H_2O **C.** NH_3 **D.** HF

6. *In the following an exothermic gaseous reaction :($2CO+O_2 \rightarrow 2CO_2$) , which of the following statements is true about the reaction ?*

A. The reaction is always spontaneous. **B.** The reaction is never spontaneous.

C. The reaction is spontaneous at low temperature. **D.** The reaction is spontaneous at high temperature.

7. *In the following hypothetical reaction :($A_2+B_2 \rightarrow 2AB+30kJ$), the activation energy for the forward reaction equal 50kJ/mol ,the activation energy for reverse reaction is equal to*

A.20kJ/mol **B.** 80kJ/mol **C.** -80kJ/mol **D.**10kJ/mol

8. *In the following reaction :($2HCl_{(g)}+184.6kJ \rightarrow H_{2(g)}+Cl_{2(g)}$), the standard formation enthalpy of HCl equals :*

A. 184.6kJ/mol **B.** -184.6kJ/mol **C.** -92.3kJ/mol **D.** 92.3kJ/mol

9. *Adding NH_4Cl to NH_3 solution leads to:*

A. decrease $[NH_3]$ **B.** increase $[OH^-]$ **C.** increase ionization of NH_3 **D.** increase $[H_3O^+]$

10. *How many moles of ammonium sulfate must be dissociate to produce 0.4 mol of sulfate ion?*

A. 0.2 mol **B.** 0.4 mol **C.** 0.6 mol **D.** 0.8 mol

11. *The net ionic equation for the precipitation Nickel (II)sulfide is :*

A. $NiS_{(s)} \rightarrow Ni^{+2}_{(aq)} + S^{-2}_{(aq)}$ **B.** $2Ni^{+2}_{(aq)} + 2S^{-2}_{(aq)} \rightarrow Ni_2S_{2(s)}$

C. $Ni^{+2}_{(aq)} + S^{-2}_{(aq)} \rightarrow NiS_{(s)}$ **D.** it does not have precipitate equation because it is soluble in water.

12. *When barium chloride solution is mixed with sodium nitrate:*

A. sodium chloride precipitates **B.** barium nitrate precipitates

C. precipitation does not occur **D.** Both (A + B) are correct

13. *Aqueous solution of NH_3 is an Arrhenius base because:*

A. it is proton accepter. **B.** it increases the concentration of hydronium ion.

C.it is an electron pair donor. **D.**it increases the concentration of hydroxide ion.

14. *While mixing a small quantity of water with a large quantity of ethanol, water considered as :-*

A. solvent **B.** solute **C.** solution **D.** none of them

15. *The methyl orange is used to determine the equivalence point in one of the following titration: If the pH range for transition interval is (3.1- 4.4):*

A. HCl, NH_3 **B.** CH_3COOH,NaOH **C.** HNO_3,NaOH **D.**NH_3,CH_3COOH

16. *The pH of an aqueous solution composed $2x10^{-4}$ mol of H_3O^+ ions in 250 mL of its solution is equal to :-*

A. 3.1 **B.** 3.7 **C.** 10.9 **D.** 10.3

17. *The rate of the slow reaction increases by :*

A. the addition of a catalyst. **B.** increasing activation energy

C. increasing concentration. **D.** Both (A+C) are correct

18. *All of the following statements are true about the collision theory except:*

A. all collisions between particles of reactant leads to the occurrence of the chemical reaction

B. the reaction rate is directly proportional with the number of effective collision.

C. in order for chemical reaction to occur, the reacting particles must collide

D. the particles of reactants must have enough energy to initiate the reaction.

19. *The rate law of the following reaction: $A+2B \rightarrow AB_2$,is $R=k[B]^2$, what happens to the reaction rate when the concentration of both reactants is doubled?*

A. the reaction rate remains the same. **B.** the reaction rate increases by a factor of two.

C. the reaction rate increases by a factor of four. **D.** the reaction rate increases by a factor eight.

20. *A proposed mechanism for the reaction is:- slow :$2NO+H_2 \rightarrow N_2O+H_2O$*

fast :$N_2O+H_2 \rightarrow N_2+H_2O$ which of the following is correct ?

A. $R=k[NO][H_2]$ **B.** overall balanced equation for the reaction is :$2NO+2H_2 \rightarrow N_2+2H_2O$

C. the reaction order is second **D.** Both (A+C) are correct

21. *The energy required to raise the reactant to the level of the activated complex is:*

A. Activation energy **B.** Free energy **C.** Kinetic energy **D.** Energy of reaction

22. *Calculate the moles of NaOH if 100 mL of its solution neutralized with 200 mL of 0.01M HBr ?*

A. 0.01mol **B.** 0.002mol **C.** 0.001mol **D.** 0.02mol

23. *A substance that formed when a strong acid has lost a proton*

A. strong conjugate base **B.** weak conjugate acid **C.** weak conjugate base **D.** cations

24. *For an exothermic dissolution process, the increasing of the temperature causes:*

A. increasing dissolution **B.** decreasing dissolution **C.** decreasing crystallization **D.** Both (A+C) are correct

25. *In equilibrium gaseous reaction: $2NO+Cl_2 \rightleftharpoons 2NOCl$ +energy, which of the following shift the reaction to the right ?*

A. adding catalyst **B.** decreasing system volume **C.** increasing temperature **D.** decreasing pressure

26. *Unknown liquid miscible with toluene and immiscible with water which of the following statements is correct?*

A. an aqueous solution for the liquid conducts electric current. **B.** a liquid is nonpolar molecular compound.

C. a liquid is polar molecular compound. **D.** none of them

27. *All of them are correct except:*

A. An ionic compound at solid state does not conduct electric current.
B. Alloy is a mixture the atoms of two or more metals are uniformly mixed.
C. The Brownian motion is a motion due to collision rapidly moving molecules.
D. HCl does not soluble in water.

28. *The boiling-point elevation of a solvent is 2.4°C, when the concentration of the solution containing a nonelectrolyte solute is 3.1m, what is the value of molal boiling-point constant?*

A. 1.29°C/m **B.** -0.77°C/m **C.** 7.44°C/m **D.** 0.77°C/m

29. *The following reaction :(2A+B $\rightarrow A_2B$) is occur by one step mechanism the rate law for the reaction is*:

A. R=k[A][B] **B.** R=k[A_2B] **C.** R=k[A]^2[B] **D.** R=k[A][B]^2

30. *When polar compound ionizes completely in water the compound is:*

A. ionic electrolyte. **B.** weak electrolyte. **C.** non-electrolyte molecular. **D.** strong molecular electrolyte.

31. *The dilute aqueous solution of a weak acid contains:*

A. hydronium ions. **B.** acid molecules. **C.** anions. **D.** all of them are correct

32. *Which of the following is the equilibrium constant for an anion hydrolysis reaction?*

A. $\frac{[HB][OH^-]}{[B^-]}$ **B.** $\frac{[B^-]}{[HB][OH^-]}$ **C.** $\frac{[HB]}{[B^-][OH^-]}$ **D.** $\frac{[B^-][OH^-]}{[HB]}$

33. *In the following reaction :($BF_{3(aq)} + F^-_{(aq)} \rightarrow BF_4^-{}_{(aq)}$) which of the following is Lewis base?*

A. F^- **B.** BF_3 **C.** BF_4^- **D.** none of them is correct

34. *The strength of an acid does not depend on:*

A. The polarity of the bond between hydrogen and the element it is bonded. **B.** the bond energy
C. the number of hydrogen atoms in the chemical acid formula. **D.** both (A+B) are correct

35. *The concentration of H_3O^+ ions in aqueous solution of $Ba(OH)_2$ is $1x10^{-11}$ M, what is the molar concentration of solution?*

A. $1x10^{-3}$ M **B.** $2x10^{-4}$ M **C.** $2x10^{-3}$ M **D.** $5x10^{-4}$ M

36. *How much energy would be absorbed as heat by 75g of iron when heated from 295K to 301K if its specific heat is 0.449J/g.K?*

A. 202kJ **B.**27.83J **C.**1002J **D.** 202J

37. *The enthalpy change that occurs during the complete combustion of one mole of an element or compound is called:*

A. Enthalpy of formation. **B.** Enthalpy of solution. **C.** Enthalpy of combustion. **D.** Specific Heat

38. *Which of the following represents the formation equation?*

A. $N_2+O_2 \rightarrow 2NO$ **B.** $C_{(graphite)} + O_2 \rightarrow CO_2$ **C.** $CO+1/2\,O_2 \rightarrow CO_2$ **D.** $CO_2 \rightarrow C_{(graphite)} + O_2$

39. *The entropy increases at:*

A. evaporating of liquid **B.** temperature raising. **C.** increase pressure **D.** both(A+B) are correct

40. *The value of equilibrium constant for this gaseous reaction :($N_2O_4 \rightleftharpoons 2NO_2$) is 0.1 at a specified temperature, what would be the value of that constant for the reverse reaction at the same condition?*

A. 0.05 **B.** 0.1 **C.** 10 **D**. 5

41. *In the following gaseous reaction:($N_2+3H_2 \rightleftharpoons 2NH_3$) it was found the $[NH_3]=0.62$ M ,$[H_2]=0.14$ M, $[N_2]=0.45$ M the value of the equilibrium constant equals:*

A. $3.2x10^{-3}$ **B.** $3.11x10^{2}$ **C.** $3.11x10^{-2}$ **D.** 9.84

42. *The solubility product of cadmium carbonate, $CdCO_3$, is $1.0x10^{-12}$ .In a saturated solution of this salt, the concentration of carbonate ions is:*

A. $5x10^{-13}$ M **B.** $3x10^{-6}$ M **C.** $1x10^{-6}$ M **D.** $5x10^{-7}$ M

43. *In aqueous solution contains, Ca^{+2},SO_4^{2-} ions, $CaSO_4$ precipitates if :*

A. $[Ca^{+2}][SO_4^{2-}]=K_{sp}$ **B.** $[Ca^{+2}][SO_4^{2-}] > K_{sp}$ **C.** $[Ca^{+2}][SO_4^{2-}] < K_{sp}$ **D.** can not be determined

44. *Which of the following ions hydrolyze in aqueous solution?*

A. NO_3^- **B.** CO_3^{2-} **C.** SO_4^{2-} **D.** none of them is correct

45. *The common-ion causes:*

A. increasing precipitation. **B.** decreasing ionization.
C. shifting equilibrium to left. **D.** all of them are correct.

46. *Which of the following is homogenous mixture?*

A. milk **B.** 24-karat gold **C.** tap water **D.** oil and water

47. *Which of the following is a binary acid?*

A. H_2S **B.**H_2CO_3 **C.** H_2O_2 **D.** all of them are correct

48. *The solution that contains the precisely known concentration of a solute is known as:*

A. saturated solution **B.** dilute solution **C.** standard solution **D.** buffer solution

49. *the spectator ion in the following reaction ($Al_{(S)} + H_2SO_{4(aq)} \rightarrow$), is;*

A. SO_4^{2-} **B.** Al^{+3} **C.** H_3O^+ **D.** all of them are correct.

50. *A reaction has ΔH=-74.8kJ/mol , ΔS=-0.081kJ/mol.K at 27°C which of the following is correct?*

A. ΔG= 50.5 kJ/mol , nonspontaneous . **B.** ΔG= -72.8 kJ/mol , spontaneous.
C. ΔG= 72.8 kJ/mol , nonspontaneous **D.** ΔG= -50.5 kJ/mol , spontaneous.

A