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

2nd Attempt

Fingerprint

Choose the correct answer (two marks for each question).

1. One of the following salts is insoluble in water:
A. SrS **B**. $Mg(ClO_3)_2$ **C**. CdS **D**. $CaCl_2$

2. The molal concentration of an aqueous $CaCl_2$ solution that freezes at -2.43°C is:- (K_f = -1.86°C/*m*)
A. 0.435*m* **B**. 0.653*m* **C**. 1.306*m* **D**. 2.29*m*

3. Which of the following statements is correct about an aqueous solutions of KCl and sucrose, with same concentration? **A**. both solutions have the same vapor pressure.
B. sucrose solution would boil at a lower tempeature.
C. KCl solution would freeze at higher temperature.
D. both solutions would boil at the same temperature.

4. By dissolving aluminum sulfate in water, 0.3 moles of aluminum ions are produced, how many moles of sulfate ions are produced? **A**. 0.6 **B**. 0.15 **C**. 0.75 **D**. 0.45

5. Which of the following solutions would contain the lowest concentration of hydronium ions(H_3O^+)? **A**. HCl **B**. CH_3COOH **C**. KNO_3 **D**. NH_4Cl

6. The chemical formula of chlorite is :- **A**. Cl^- **B**. ClO_2^- **C**. ClO^- **D**. ClO_3^-

7. One of the following compounds is not Bronsted-Lowry acid:
A. H_2O **B**. NH_4^+ **C**. HIO **D**. BF_3

8. Is an acid used in the manufacture of detergents and ceramics:
A. H_3PO_4 **B**. HCl **C**. CH_3COOH **D**. HNO_3

9. If $[Mg^{2+}]^3[PO_4^{3-}]^2<K_{sp}$,the net ionic equation for neutralization reaction of H_3PO_4 and $Mg(OH)_2$is:
A. $2H_3PO_4(aq) + 3Mg(OH)_2(aq) \longrightarrow Mg_3(PO_4)_2(s) + 6H_2O(l)$
B. $6H_3O^+(aq) + 6OH^-(aq) \longrightarrow 12H_2O(l)$
C. $6H_3O^+(aq) + 2PO_4^{3-}(aq) + 3Mg^{2+}(aq) + 6OH^-(aq) \longrightarrow Mg_3(PO_4)_2(s) + 12H_2O(l)$
D. $H_3O^+(aq) + OH^-(aq) \longrightarrow 2H_2O(l)$

10. An aqueous solution of sulfuric acid contains all of them except:
A. H_3O^+ **B**. H_2SO_4 **C**. SO_4^{2-} **D**. HSO_4^-

11. The required mass of $Ca(OH)_2$ in 500mL of its solution to make pH equal to 13 is:
(molar mass=74g/mol) **A**. 1.85g **B**. 3.7g **C**. 7.4g **D**. 0.925g

12. Which of the following solutions is an acid at 25°C?
A. pH=12 **B**. pOH=3.5 **C**. $[H_3O^+]=1.0x10^{-7}M$ **D**. $[OH^-]=1.0x10^{-12}M$

13. By heating 500mL of pure water to 50°C which of the following relationships is correct?
A. $[H_3O^+]>[OH^-]$ **B**. $[OH^-]>[H_3O^+]$ **C**. $[H_3O^+]=[OH^-]$ **D**. $[H_3O^+][OH^-]=1.0x10^{-14}$

14. In the reaction between dilute sulfuric acid and barium metal produce…….and hydrogen gas.
A. barium sulfide **B**. barium sulfite **C**. barium sulfate **D**. Ba_2SO_4

15. By titration 17.6mL of diprotic acid solution neutralized 27.4mL of 0.0165 M KOH solution, the molarity of acid is: **A**. 0.0257M **B**. 0.0128 **C**. 3.8M **D**. 0.128M

16. In the following reaction: $A_2B+80kJ \longrightarrow 2A+B$, Ea'= 20kJ/mol and the reactants' energy is -20kJ/mol , the activated complex energy is equal:
A. 100kJ/mol **B**. 60kJ/mol **C**. 80kJ/mol **D**. 120kJ/mol

17. If 3.5kJ of energy are added to a 28.15g sample of iron at 20°C, the final temperature of the iron in kelvins is: (c_p=0.449J/(g.K)) **A**. 277 **B**. 570 **C**. 297 **D**. 470

18. The standard enthalpy of formation for each of $CO_2(g)$,$H_2O(l)$ and C_5H_{12} respectively is (-394,-286,-147)kJ/mol, the enthalpy of combustion of pentane is:
A. -107kJ/mol **B**. -3539kJ/mol **C**. 3539kJ/mol **D**. 107kJ/mol

19. This reaction: $2NO_2(g) \longrightarrow N_2O_4(g)$ + energy , is spontaneous at:
A. equilibrium **B**. all temperatures
C. lower temperatures **D**. higher temperatures

20. A reaction has ΔH^0=206.1kJ/mol and ΔS^0=0.215kJ/(mol.K) at room temperature, which of the following is correct?
A. ΔG^0= -142.0kJ/mol , spontaneous **B**. ΔG^0= +142.0kJ/mol ,nonspontaneous
C. ΔG^0= -200.725kJ/mol , spontaneous **D**. ΔG^0= +270.17kJ/mol, nonspontaneous

21. Is a type of energy transferred spontaneously from a matter at higher temperature to a matter at lower temperature. **A**. specific heat **B**. temperature **C**. enthalpy of formation **D**. heat

22. The slowest step in a reaction mechanism is called:
A. the uncatalyzed reaction **B**. the activation step
C. the rate-determining step **D**. none of them

23. One of the following does not change by changing temperature:
A. specific rate constant **B**. number of effective collision
C. rate of reaction **D**. activation energy

24. This reaction: $A+2B \longrightarrow C$, is second order, found when [B] was doubled, the reaction rate doubled, which of the following is correct?
A. R=k[A][B] **B**.the reaction occur in the one-step mechanism
C. $R=k[B]^2$ **D**. both (A and B) are correct

25. In the following reaction: $2NO_2 \longrightarrow 2NO+O_2$, the first step reaction is: ($NO_2 \longrightarrow NO+O$) , which of the following is a second step reaction?
A. $NO_2+O \longrightarrow NO_3$ **B**. $NO_2+O \longrightarrow NO+O_2$ **C**. $2NO+O \longrightarrow N_2O_3$ **D**. $NO_2+O_2 \longrightarrow N+2O_2$

26. In which of the following equilibrium systems the concentration of products is highest?
A. $H_2SO_3(aq)+H_2O(l) \rightleftharpoons H_3O^+(aq)+HSO_3^-(aq)$ *K*=1 **B**. $H_2(g)+I_2(g) \rightleftharpoons 2HI(g)$ *K*=54.6
C. $N_2(g)+O_2(g) \rightleftharpoons 2NO(g)$ $K=1.1x10^{-5}$ **D**. cannot determined

27. Is a salt when dissolved in water increases hydroxide ion concentration:
A. KCN **B**. $NaNO_3$ **C**. NH_4Cl **D**. none of them

28. The concentration of fluoride ions in a saturated solution of CaF_2 is $2.2x10^{-3}$mol/L , the K_{sp} value equal: **A**. $1.1x10^{-3}$ **B**. $1.3x10^{-9}$ **C**. $5.3x10^{-9}$ **D**. $4.2x10^{-8}$

29. The following gaseous reaction: ($2SO_2 + O_2 \rightleftharpoons 2SO_3 + 198kJ$), reached equilibrium at 600°C,at which of the following temperature the value of equilibrium constant (*K*) is highest?

A. 700°C **B**. 500°C **C**. 300°C **D**. 400°C

30. Which of the following reactions the equilibrium shifts to left direct by decreasing system volume? **A**. $H_2CO_3(aq)+H_2O(l) \rightleftharpoons HCO_3^-(aq)+H_3O^+(aq)$ **B**. $2HCl(g) \rightleftharpoons H_2(g)+Cl_2(g)$

C. $N_2(g)+3H_2(g) \rightleftharpoons 2NH_3(g)$ **D**. $2CO_2(g) \rightleftharpoons 2CO(g)+O_2(g)$

31. All of the following solutions can resist changes in pH by addition a small amount of an acid or base except: **A**. $HClO_4,RbClO_4$ **B**. NH_3,NH_4NO_3 **C**. $HNO_2,NaNO_2$ **D**. HCN,KCN

32. In this reaction: $CaH_2(s)+2H_2O(l) \longrightarrow Ca(OH)_2(aq)+2H_2(g)$,one of the following is oxidized:

A. H **B**. O **C**. Ca **D**. none of them

33. After balancing the following half-reaction: ($MnO_2 \longrightarrow Mn_2O_3$), in basic solution, Mn :

A. two electrons are gained **B**. one electron is gained

C. two electrons are lost **D**. one electron is lost

34. In which of the following compounds the oxidation number of xenon is highest?

A. XeO_3 **B**. XeF_2 **C**. $XeOF_2$ **D**. $CsXeF_8$

35. In one of the following reactions a substance acts as both an oxidizing agent and reducing agent at the same time? **A**. $HCl+HOCl \longrightarrow Cl_2+H_2O$ **B**. $Cr_2O_7^{2-} \longrightarrow CrO_4^{2-}+Cr_2O_3$

C. $3FeO \longrightarrow Fe_2O_3+Fe$ **D**. all of them

36. The ions in voltaic cells is transferred by:

A. anode electrode **B**. cathode electrode **C**. connecting wire **D**. salt bridge

37. Which metal would best provide cathodic protection from corrosion for an iron bridge? If E^0_{reduce} for (Fe^{2+}, Mg^{2+}, Sn^{2+}, Cu^{2+}, Al^{3+}) respectively is (-0.41, -2.37, -0.14, 0.34 ,-1,66) volt

A. Mg **B**. Al **C**. Sn **D**. Cu

38. When silver is electroplated onto another metal, Ag is:

A. oxidized at the anode **B**. reduced at the cathode

C. reduced at the anode **D**. oxidized at the cathode

39. Ore bauxite is used to produce……by electrolysis.

A. Nickel **B**. iron **C**. copper **D**. aluminum

40. Which of the following types of molecular representations can be used to show differences between isomers?

A. molecular formula **B**. empirical formula **C**. structural formula **D**. both (A and C)

41. For this reaction : $2Li^+ + Zn \longrightarrow 2Li + Zn^{2+}$, which of the following is correct? (E^0_{reduce} Li^+= -3.04, E^0_{reduce} Zn^{2+}= -0.76)volt.

A. E^0_{cell}= +2.28V,spontaneous **B**. E^0_{cell}= -2.28V,nonspontaneous

C. E^0_{cell}= +3.80V,spontaneous **D**. E^0_{cell}= -3.80V,nonspontaneous

42. The correct name for the following compound: $CH_3\text{-}\underset{F}{CH}\text{-}\underset{Br}{CH}\text{-}CH_3$,according IUPAC system is:

A. 2-fluoro-3-bromo butane **B**. 3-fluoro-2-bromo butane

C. 2,3-bromofluoro butane **D**. 2-bromo-3-fluoro butane

43. A compound C_7H_{12} is called:

A. octene **B**. octyne **C**. heptene **D**. heptyne

44. Which of the following properties for diamond is incorrect?

A. good heat conductor **B**. good electrical conductor

C. it has high density **D**. it has extremely high melting point

45. The name of this compound: $CH_2=CH\text{-}CH=\underset{CH_3}{C}\text{-}CH_3$,according IUPAC system is:

A. 2-methyl-2,3-pentadien **B**. 2-methyl-2,4-pentadien

C. 4-methyl -1,3-pentadien **D**. 4-methyl-1,3-butadien

46. Which of the following hydrocarbons is less chemically reactive?

A. benzene **B**. alkene **C**. alkyne **D**. cannot determined

47. The type of this organic reaction: $CH_3\text{-}\overset{O}{\overset{\|}{C}}\text{-}OH+CH_3\text{-}OH \longrightarrow CH_3\text{-}\overset{O}{\overset{\|}{C}}\text{-}O\text{-}CH_3+H_2O$ is:

A. addition **B**. condensation **C**. elimination **D**. substitution

48. Are organic compounds in which the carbonyl group is attached to carbon atoms within the chain: **A**. ketones **B**. aldehydes **C**. carboxylic acids **D**. esters

49. Is a poisonous alcohol is used as octane enhancers in fuel and as alternative fuels:

A. methanol **B**. glycerol **C**. ethanol **D**. 1-propanol

50. In many organic reactions ,an ether is used as a solvent instead of:

A. alcohol **B**. water **C**. benzene **D**. alkane