Half Yearly Examination 2017-2018

Std. : XII **Full Marks : 70**

Subject : Chemistry Time : 2 Hrs.+15mins.

[Questions 1 is of 20 marks and all questions are compulsory. Questions 2 to 8 carry 2 marks eachwith the questions having internal choices. Q 9 to 5 carry 3 marks each with the questions having internal choices. Q 16 to 18 carry 5 marks each and all of them have interenal choices]

Part - I (20 marks)

[Answer all questions]

Q.1. a) Fill in the blanks by choosing the appropriate word/words from those given in the brackets : [4x1=4]

[sp^3d^3, sp^3d^2, octahedral, distorted octahedral, Frenkel defect, F-centres, liquid, solid, gas, cationic, anionic, phenyl eyanide, phenyl, isocyanide, Hofmann's degradation, carbylamine]

(i) The geometry of XeF_6 molecule is _____ and the hybridization of Xe atom in the molecule is _____.

(ii) Fog is a colloidal solution of _____ in _____

(iii) Appearance of colour is solid alkali metal halides is generally due to _____ and this happens when electrons lost by cations occupy _____ sites.

(iv) Reaction of aniline with $CHCl_3$—KOH yields _____ and the reaction is known as _____ reaction.

b) Complete the following statements by selecting the correct alternatives from the choices given:- [4x1]

(i) $X \xrightarrow{PCl_5} C_2H_5Cl$; $Y \xrightarrow{PCl_5} CH_3COCl$; X & Y are

a) $(C_2H_5)_2$ O and CH_3COOH (b) C_2H_5I and C_2H_5 CHO

c) C_2H_5OH and CH_3COOH (d) C_2H_5OH and C_2H_5CHO.

(ii) For the Freundlich isotherm a graph of Log $^x/_m$ is plotted against log P. The slope of the line and its Y axis intercept respectively corresponds to :

a) $^1/_n$, k (b) log $^1/_n$, k (c) $^1/_n$, log k (d) Log $^1/_n$, Log k.

(iii) The compound obtained by reducing CH_3CN with Na/C_2H_5OH is —

a) Methyl alcohol (b) acetic acid (c) ethyl amine (d) methane.

(iv) Which halogen has tendency to from cations ?

(a) Fluorine (b) Chlorine (c) Bromine (d) iodine.

(c) Answer the following questions :— **[4x2]**

(i) Draw the structure of IF_7 molecule. State the hybridisation and number of lone pairs around central atom.

(ii) Write balanced equations for the following reactions :

a) Chlorine reacts with acidified ferrous sulphate

b) Potassium permanganate (acidified) reacts with oxalic acid.

(iii) Convert phenol to benzoic acid.

(iv) Write two differences between Frenkel defects and schottky defects.

(d) Match the following :— **[4x1=4]**

(i)	Molal depression constant	(a)	Tertiary alcohol
(ii)	Lucas test	(b)	Primary amine
(iii)	Negatively charged sol	(c)	K Kg mol^{-1}
(iv)	Phenol + benzene diazonium chloride	(d)	AS_2O_3
		(e)	coupling
		(f)	$molLl^{-1}$

Part II

Q2. Explain the following :

a) Physisorption decreases with an increase in temperature.

b) Addition of alum purifies water.

OR

In a compond, atoms of element Y form hcp lattice and those of element X occupy 1/3rd of tetrahedral voids. What is the formula of the compound ?

Q3. Explain :

a) Acetic acid is weaker than formic acid.

b) Anilineis not as basic as ammonia.

Q4. Distinguish between :

a) Benzaldehyde and benzoic acid.

b) Ethyl amine and acetamide.

OR

a) Ethyl amine and aniline

b) Phenol and ethanol.

Q5. In a first order reaction, the concentration of the reactants is reduced to 1/8th of the initial concentration in 75 minutes. What is the half-life period of the reaction in minutes ?

Q6. Identify A,B,C,D :

a) $C_6H_5NO_2 \xrightarrow{Fe/HCl} A \xrightarrow[273\ k]{NaNO_2 + HCl} B$

b) $CH_3CH_2Cl \xrightarrow{NaCN} C \xrightarrow[\text{Partial hydrolysis}]{OH^-} D$

Q7. Convert : a) Benzoic acid to aniline.

b) Ethyl iodide to acetic acid.

8. What do you observe when :

a) Mercuric chloride is added to formic acid.

b) Bromine water is added to phenol. Write the name of the reuslting compound.

9. An element with molar mass $2.7x10^{-2}$ kg mol^{-1} forms a cubic unit cell with edge length 405 pm. If its density is $2.7x10^3$ kg m^{-3}, what is the nature of the unit cell ?

OR

Lithium has a bcc structure. Its density is 530 kgm^{-3} and its atomic mass is 6.94g mol^{-1}. Calculate the edge-length of a unit cell of lithium metal.

10. Write balanced equations for the following named reactions :

a) HVZ reaction (b) Hofmann's bromamide reaction.

c) Wolff - Kishner reduction.

11. i) Write IUPAC names of the following compounds :—

a) $K_3[Cr(C_2O_4)_3]$ (b) $[Co(NH_3)_6]$ $[Cr(CN)_6]$.

c) $[Ti\ (H_2O)_6]^{3+}$

ii) Draw the structure of dichromate ion.

OR

i) For the compound $[Fe(CN)_6]^{4-}$

a) What is the hybridisation of the central atom ?

b) State the oxidation number of central metal ion.

c) State its magnetic behaviour.

ii) Draw the structure of the compound $XeOF_2$.

12. (i) Write balanced equations for the following reactions :—

a) Concentrated hydrochoric acid reacts with conc. nitric acid.

b) Potassium dichromate reacts with hydrogen sulphide in acidic medium.

(ii) Fluorine provides the largest variety of interhalogen compounds among halogens — why ?

13. (i) Name :- (a) The hydride of group 15 which is strongest reducing agent.

(b) An element of group 16 which forms maximum number of oxoacids.

(c) A noble gas not present in the atmosphere.

(d) The halogen hydracid which is strongest acid.

(ii) Give reasons :- (a) Noble gases have very low boiling point.

(b) Bond enthalpy of fluorine is lower than that of chlorine.

(c) The valency of oxygen is generally 2, where as sulfur shows valency of 2,4 & 6.

14. (a) 0.1 (M) $AlCl_3$ is more effective than 0.1 (M) NaCl solution in coagulating an AS_2S_3 solution.

(b) A metal crystallises with fcc cubic lattice. The edge of the unit cell is 408 pm. What is radius of the metal atom ?

(c) In the crystal structure of coppermetal, state the nature of the cubic structure and the coordination number of each copper metal ion.

15. a) According to Freundlich adsorption isotherm, which one is correct ?

(i) $^{x}/_{m} \alpha p^{1}$ (ii) $\frac{x}{m} \alpha p^{1}/_{n}$ (iii) $\frac{x}{m} \alpha p^{o}$

(iv) All the above, in different pressure.

b) 1.02% solution of glycerine and 2% solution of glucose are isotonic. Molecular weight of glucose is 180. Find out molecular weight of glycerine.

16. a) The rate constant of the first order reaction is given by the equation :

$$\text{Log}_e K (\text{Sec}^{-1}) = 14.34 - \frac{1.25 \times 10^4}{T}.$$

Calculate :

(i) The activation energy.

(ii) The a constant at 500 K.

(iii) At what temperature will its half- life period be 256 minutes ?

b) Give one example each of homogeneous and heterogeneous catalysts.

c) What is metal excess defect due to cation vacancy ?

OR

a) An aqueous solution containing 12.48g of barium chloride in 1kg of water boils at 373.0832 K Calculate the degree of dissociation of barium chloride. [Given K_b for H_2O = 0.52 km^{-1}, Molar mass of $BaCl_2$ = 208.34 $gmol^{-1}$].

b) Explain why if a little gelatin is added to gold sol the latter is not readily precipitated by addition of sodium chloride.

c) What is the percentage of empty space in b.c.c. and f.c.c. cubic arrangement ?

17. a) Give reasons :—

(i) Interhalogen compounds have weaker bond between two atoms as compared to halogens.

(ii) Xenon forms a large number of compounds with oxygen and fluorine.

(iii) Ammonia is a good complexing agent.

b) Write the reactions in the extraction of iron in different zones in blast furnace.

OR

a) Write balanced equations for the following :—

(i) Formation of phosphorus trichloride from white phosphorus and chlorine gas.

(ii) Reaction of chlorine with hot concentrated sodium hydroxide.

b) Draw geometrical isomers of $[Cr(H_2O)_2(Ox)_2]^+$

c) A coordination compound $CoCl_3.4H_2O$ precipitates silver chloride when treated with $AgNO_3$. The molar conductance corresponds to two ions only. Write structural formula of the compound and name it.

18. a) Carry out the following conversions :—

(i) Chlorobenzene to nitrobenzene.

(ii) Acetaldehyde to ethanamide.

(iii) Account for the following :—

(i) 2-nitrophenol boils at lower temperature than 4-nitrophenol.

(ii) Propanoic acid is weaker than acetic acid.

OR

a) Write balanced equations for the following reactions :—

(i) When acetic acid reacts with phosphorus pentachloride.

(ii) Acetone reacts with NaOH and crystals of iodine.

b) Identify A, B, C, D, E, F :

(i) $CH_3CH_2Br \xrightarrow{KCN} A \xrightarrow{LiAlH_4} B \xrightarrow[0^oC]{HNO_2} C$

(ii) $C_6H_6 \xrightarrow[\text{conc. } H_2SO_4,\ 333\ k]{\text{conc.}HNO_3} D \xrightarrow{Sn/HCl} E \xrightarrow[KOH]{CHCl_3} F$