CHEMISTRY QUESTION PAPER
CLASS - XII

Time : Three Hours Max. Marks : 70

General Instructions

1. All questions are compulsory.
2. Questions nos. 1 to 8 are very short answer questions and carry 1 mark each.
3. Questions Nos. 9 to 18 are short answer questions and carry 2 marks each.
4. Questions nos. 19 to 27 are also short answer questions and carry 3 marks each.
5. Questions nos. 28 to 30 are long answer questions and carry 5 marks each.
6. Use log tables if necessary, use of calculators is not allowed.

Q1. Identify the reaction order if unit of rate constant is $L \, mol^{-1} \, S^{-1}$.

Q2. What do you understand by adsorption isobar.

Q3. Name the molecular geometry of XeO_3.

Q4. Give the chemical formula for the compound hexammine platinum (IV) chloride.

Q5. Write the structure of the following compound.

p-$ClC_6H_4CH_3$.

Q6. When phenol is treated with bromine water white ppt. is obtained. Give the structure and name of the compound formed.

Q7. What type of aldehyde undergo Cannizaros reaction?

Q8. Some enzymes are named after the reaction, where they are used. What name is given to the class of enzymes which catalyse the oxidation of the one substrate with simultaneous reduction of another substrate

Q9. A body centered cubic element of density $10.3 g \, cm^{-3}$ has a cell edge of 314 pm. Calculate the atomic mass of an element.

$N_A = 6.023 \times 10^{23} \, mol^{-1}$.

Q10. State Kohlrausch law of independent of migration of ions. Mention one application of Kohlrausch law.

Q11. Account for the following:-

i. ZnO on heating changes to yellow.

ii. Metals are good conductor of electricity.

Q12. The activation energy for the reaction:-

$2HI(g) \longrightarrow H_2(g) + I_2 (g)$

is 209.5 $kJmol^{-1}$ at 581 k. Calculate the fraction of molecules of reactants having energy equal to or greater than activation energy.

Q13. 1. What type of hybridisation is associated with N - atoms in NH_3? What is the expected bond angle in NH_3.

2. NCl_5 is not known.

OR

1. Give chemical equation is support of the fact that all bonds in the molecule of PCl_5 are not equivalent.

2. HF is weaker acid than HI

Q14. Explain as to how the two complexes of nickel $[Ni(CN)_4]^{2-}$ and $[Ni(Co)_4]$, have different structures but donot differ in their magnetic behaviour.

Q15. Consider the rate equation for

$$H_2(g) + Br_2(g) \longrightarrow 2\ HBr(g).$$

Under certain condition as rate $= K[H_2)\ [Br_2]^{3/2}\ [(HBr]^{-1}$.

Answer the following questions:-

i. What is the order with respect to each reactant.

ii. What is the overall order of this reaction.

Q16. Manu and Tanu went to a science seminar to attend the lecture on the importance of Ozone layer in the upper region of atmosphere and to ban the use of freons.

According to you:-

i. What is the importance of Ozone.

ii. Why use of Freon is the threat to Ozone layer.

Q17. Distinguish between

1 Aniline and N,Ndiethyl aniline

2. Aniline and Methyl aniline

Q18. Give explanation for each of the following:-

i. Aromatic amines cannot be prepared by Gabriel pthalimide synthesis.

ii. Primary amines have higher boiling point than tertiary amines.

Q19. The following chemical reaction is occurring in a electrochemical cell:-

$Mg(s) + 2Ag + (0.0001M) \longrightarrow Mg^{2+}(0.10M) + 2Ag(s)$

The E^o values are $Mg^{2+}/Mg = -2.30$ V, $Ag^+/Ag = 0.81V$

For this cell calculate and write:-

i. E^o values for the electrode $2Ag^+/2Ag$.

ii. Standard cell potential.

iii. Cell potential E cell.

Q20. Explain the following terms:-

i. Electrophoresis.

ii. Dialysis.

iii. Peptization.

Q21. Describe the note of the following:-

i. NaCN in the extraction of silver from a silver ore.

ii. Iodine in refinning of titanium.

iii. Crylote in the metallurgy of Al.

Q22. How is Xeo_3 obtained? Write the related chemical equations. Draw the structure of Xeo_3.

Q23. Explain why (i) the dipole moment of chlorobenzene is lower than that of cyclohexyl chloride?

i. Alkyl halides, though polar, are immiscible with water?

ii. Grignard reagents should be prepared under anhydrous conditions?

OR

Primary alkyl halide C_4H_9Br (a) reacted with alcoholic KOH to give compound (b). Compound (b) is reacted with HBr to give (c) which is an isomer of (a). When (a) is reacted with Na metal, it gives a compound (d), C_8H_{18} which is different from the compound formed when n-butyl bromide is reacted with sodium. Give the structural formula of (a) and wirte the equations for all the reactions.

Q24. Write equations of the following reactions:-
i. Friedel-Crafts reaction--alkylation in anisole.
ii. Nitration of anisole.
iii. Bromination of anisole in ethanoic acid medium.

Q25. Give the preparation and two uses of the following:-
i. Bakelite.
ii. Terylene or Decron.
iii. Teflon.

Q26. i. Name a substance which can be used as antiseptic as well as disinfectant.
ii. What are main constituents of dettol?
iii. What is tincture of iodine? What is its use?

Q27. i. What is the effect of denaturation on the structure of proteins?
ii. Why are vitamin A and vitamin C essential to us? Give their important sources.

Q28. (a) Illustrate the following name reactions giving a chemical equation in each case:-
    i. Clemmensen reaction.
    ii. Cannizaro's reaction.
(b) Describe how the following conversions can be brought about:
    i. Cylohexanol to cyclohexan-1-one
    ii. Ethylbenzene to benzoic acid
    iii. Bromobenzene to benzoic acid

OR

(a) Illustrate the following name reactions:-
    i. Hell-Volhard - Zelinsky reaction
    ii. Wolff-Kishner reduction reaction
Account for the following
  1. Benzoic acid doesnot undego Friedel-Craft reaction
  2. pKa value value of chloroacetic acid is lower than pKa value of acetic acid

Q29. a. Complete the following chemical reaction equations:-
    i. $Fe^{2+}(aq) + MnO_4(aq) + H^+ (aq)$ --->
    ii. $Cr_2O^{2-}_7$ (aq) + H^+ (aq) ---->
b. Explain the following observations:-
   i. Transition elements are known to form many interstitial compounds.

ii. With the same d^4, d-orbital configuration Cr^{2+} ion is reducing while Mn^{3+} ion is oxidising.

S.No.	Unit	VSA1	SA-1(2)	SA-2(3)	LA(5)	TOTAL

iii The enthalpies of atomisation of the transition elements are quite high.

OR

a. Complete the following chemical reaction equations:-

    i. $Cr_2O^{2-}{}_7(aq) + H_2Sg) + H^+(aq)$ ---->

    ii. $MnO_2(s) + KOH(aq) + O_2(g)$ ---->
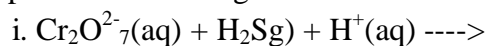
b. Explain the following observations:-

    i. Transition metals form compounds which are usually coloured.

    ii. Transition metals exhibit variable oxidation states.

    iii. The actionoids exhibits a greater range of oxidation states than the lanthanoids.

Q30. a. A storage battery contains a solution of H_2SO_4 38% by weight. At this concentration Vant Hoff factor is 2.50. At what temp will battery contents freeze?

    K_f for water = 1.86 K kg mol^{-1}.

b. Why do aqualic species feel more comfortable in the lakes in winter than in summer?

OR

a. Ethylene 4glycol molar mass 62g mol^{-1} is a common automobile antifreez. Calculate the freezing point of a solution containing 12.4g of this substance in 100g of water.

b. What is reverse osmosis. What is its importance.

BLUE PRINT

1	Solid state		4(2)			4(2)
2	Solution				5(1)	5(1)
3	Electrochemistry		2(1)	3(1)		5(2)
4	Chemical kinetics	1(1)	4(2)			5(3)
5	Surface chemistruy	1(1)		3(1)		4(2)
6	General Principles and processes of isolation of elements			3(1)		3(1)
7	p-block	1(1)	4(2)	3(1)		8(4)
8	d-f block elements				5(1)	5(1)
9	co-ordination	1(1)	2(1)			3(2)
10	Haloalakens and Haloarenes	1(1)		3(1)		4(2)
11	Alcohol,phenols and ethers	1(1)		3(1)		4(2)
12	Aldehyde, ketones and carboxylic acid	1(1)			5(1)	6(2)
13	Organic compounds containing nitrogen		4(2)			4(2)
14	Biomolecules	1(1)		3(1)		4(2)
15	Polymers			3(1)		3(1)
16	Chemistry in everydaylife			3(1)		3(1)
	Total	8(8)	20(10)	27(9)	15(3)	70(3)

MARKING SCHEME

1. SECOND ORDER----1
2. Graph plotted between magnitude of x/m and temp at constant temperature ---1
3. Pyramidal---1
4. $[Pt(NH_3)_6]Cl_4$---1
5. P-chlorotoulene---1
6. Name—1/2 ,structure----1/2

7   Which donot contain α hydrogen-----1

8 oxidoreductase enzyme ----1

9 formula ---1/2

Values –1/2

M=96g/mol   Result ---1

10 statement ---1

Application---1

11 1. ZnO on heating loses oxygen---1

2.Due to mobile electrons----1

12Fraction of molecules having energy equal to greater than activation energy

x=-Ea/2.303RT----1/2

=-209500jmol-1/2.303*8.314jK-1mol-1*581K---1/2

==19.1$\overline{6}$77---1/2

X=Antilog 19.16$\overline{7}$7   ==1.47*10^{-19}---1/2

13   N atom in NH3—SP3-----1/2

Bond angle----1/2

2. absence of d- orbital---1

Or

1. PCl5 $\underrightarrow{\Delta}$ PCl5 +Cl3---1
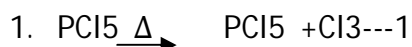
2. 2.H-F is a weaker acid than H-Cl due to strong bond and realese of H+ becomes easy.

   14 Ni(CO)4 NI(0) --SP3 ---1/2

   Tetrahedral ----1/2

   [Ni(CN)4] Ni2+ ---dsp2---1/2

   Square planar ---1/2

   15 Order with respect to H2= 1---1/2

   Order with respect to Br2= 3/2---1/2

   Order with respect to HBr= -1---1/2

   Overall Order 1+3/2-1 =3/2---1/2

   16 1. Harmful Uv Radiations are emitted by sun . The ozone layer is capable of absorbing this radiations ---1

   2 It depletes the ozone layer ---1 17

   17 1. Carbalymine test to distinguish aniline from NNdiethly aniline ---1

2 Dye test for aniline ----1

18   Aromatic primary amines cannot undergo nucleophilic substitution reaction ---1

Due to presence of two H-atom they undergo extensive intermolecular H- bonding—1

19 Values -0.81V ---1/2

2   E^0_{cell} === $E^0_{Ag+/Ag}$ - $E^0_{Mg2+/Mg}$

0.81-(-2.36)=3.16v---1 /2

3 Ecell= E^0_{cell} -0.0591/n   log$\frac{[Mg2+]}{[Ag+]}$ ----1/2

= 3.16 -0.0591/2   log $\frac{(0.10)}{(0.0001)}$ ==2.95V----1/2

20 Correct explaination -1

Correct explainaton -2

Correct explanation-1

21 1. Role of NaCN in the extraction of silver is to do the leaching of silver or in the presence of air from which silver is obtained after replacement-(1).

2 Iodine is heated with titanium to form volatile compound which on further heating decomposes to give T1.-(1).

3 cryolite lowers the melting point of mixture of alumina-(1).

22. preparation of XeO3. It is prepared by the hydrolysis of XeF4 and XeF6

XeF_4+ $3H_2O$→ Xe+ XeO_3+ F_2+ 6HF --1

XeF_6+ $3H_2O$→ XeO_3+   6HF---1
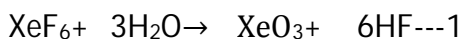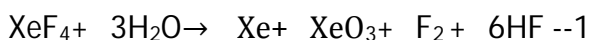
shape----1

23. chlorobenzene has lower Dipole moment than cyclohexyl chloride due to lower magnititude of negative charge on the Cl atom shorter C-Cl distance –(1).

Forces of attraction between water and halide molecules are weaker than the attraction than the attraction exactly between alkyl halide and water-(1)

Alkanes are formed(1)

Or

1. Isobutyl bromide ----1

2 2-metjyl -1- propene ---1/2

3   ter.- butyl bromide—1/2

4   2,5 dimethyl hexane   1

24 Correction reaction –(1)

    2 **C**orrection reaction -(1)

    3 correction reaction –(1)

25 Correction reaction and use –(1/2+1/2)

    2 **C**orrection reaction and use –(1/2+1/2)

    3 correction reaction and use –(1/2+1/2)

–26   0.2 percent of solution of phenol as antiseptic and 1 percent as dis infectant ----1

2 chloroxylenol   and α terpinol---1

3 2-3 percent of iodine in alcohol and water---1

27 1 correct explaination---1

2 vit a causes night blindness

Source carrot   ½+1/2

Vitc deficiency scurvy ---source citrus fruits ½+1/2

Zn/Hg Conc HCl
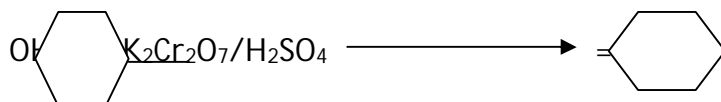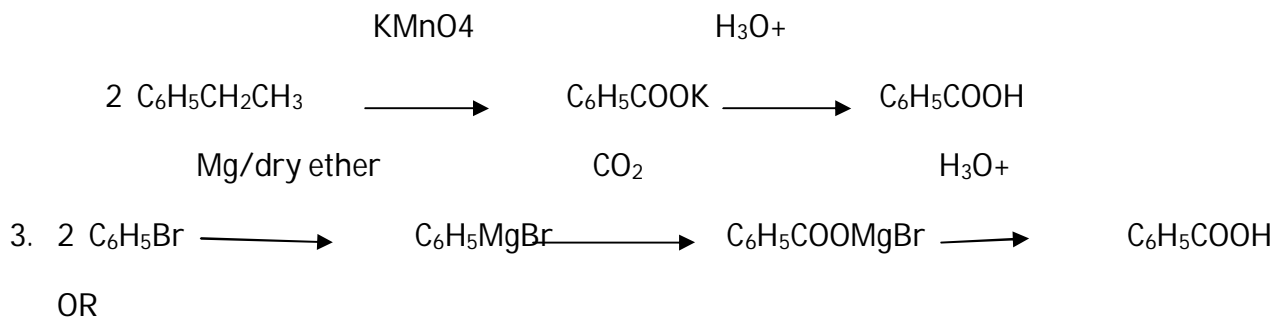
28 a 1 CH_3COCH_3+ 4[H] $\longrightarrow$ $CH_3CH_2CH_3$+H_2O---1

Conc NaOH

    2 HCHO+NaOH $\longrightarrow$ CH_3OH+HCONa -----1

    b.

OH— with $K_2Cr_2O_7$/H_2SO_4 $\longrightarrow$ =

$$2\ C_6H_5CH_2CH_3 \xrightarrow[\text{}]{\text{KMnO4}} C_6H_5COOK \xrightarrow[\text{}]{H_3O^+} C_6H_5COOH$$

3. $$2\ C_6H_5Br \xrightarrow[\text{}]{\text{Mg/dry ether}} C_6H_5MgBr \xrightarrow[\text{}]{CO_2} C_6H_5COOMgBr \xrightarrow[\text{}]{H_3O^+} C_6H_5COOH$$

OR

A 1.. $CH_3COOH \xrightarrow[\text{}]{CL_2,P} Cl_3COOH$ ----1

$$2\ RCHO \xrightarrow[\text{}]{NH_2NH_2} RCH=NNH_2 \quad \xrightarrow[\text{}]{\text{KOH/GLYCOL}} RCH_3 + N_2 \text{---1}$$
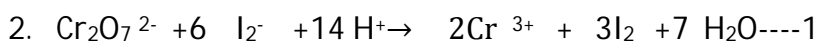
B 1   COOH group is deactivating and combines with AlCl3----1

2 due to –I effect of chlorine atoms---1

Q29 a.

1. $5Fe^{2+} + MnO_4^- \text{ (aq)} + 8H^+ \rightarrow 5Fe^{3+} + Mn^{2+} + H_2O$ ---1

2. $Cr_2O_7^{2-} + 6\ I_2^- + 14\ H^+ \rightarrow 2Cr^{3+} + 3I_2 + 7\ H_2O$ ----1
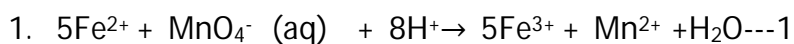
B 1. They have voids---1

2   stable t2g---1

3. 3 strong metallic bond-1

Or

1 $Cr_2O_7^{2-} + 3H2S + 8\ H^+ \rightarrow 2Cr^{3+} + 3S + 7\ H_2O$ ----1

2    $MnO_2 + 4KOH + O2 \rightarrow K_2MnO_4 + 2\ H_2O$ ---1
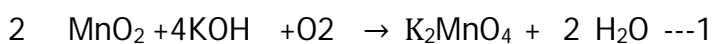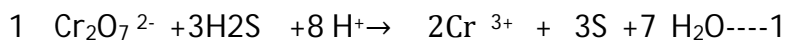
B 1. d-d transition ---1

2 (n-1)d and ns of comparable energy level ---1

3   small energy difference between 5f, 6d,,7s sub shell .---1

Q 30 ΔT_f = i*K_f*m --- 1

Values ---1/2

ΔT_f =29.08 ---1/2

Freezing point = 273-29.08 ==243.92K----1

2 solublity decreases with temperature ---2

Or

ΔT_f = K_f*m ----1

Values---1/2

9.3= 1.86 *50/W*1000/62---1/2

W= 161.29 g---1

2B when pressure more than osmotic pressure is applied ---1

Desalination of water ---1