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ERNAKULAM REGION  
SECOND PRE BOARD EXAMINATION (2018-19)  
SUBJECT : CHEMISTRY (043)  
CLASS : XII

Max.Marks : 70

Time Allowed: 3hrs

General Instructions:

- (a) All questions are compulsory.
- (b) Section A: Q.no. 1 to 5 are very short answer questions and carry 1 mark each.
- (c) Section B: Q.no. 6 to 12 are short answer questions and carry 2 marks each.
- (d) Section C: Q.no. 13 to 24 are also short answer questions and carry 3 marks each.
- (e) Section D: Q.no. 25 to 27 are long answer questions and carry 5 marks each.
- (f) There is no overall choice. However an internal choice has been provided in two questions of one mark, two questions of two marks, four questions of three marks and all the three questions of five marks weightage. You have to attempt only one of the choices in such questions.
- (g) Use of log tables if necessary, use of calculators is not allowed.

**Section A**

- 1 What is the formula of a compound in which the element P forms ccp lattice and atoms of Q occupy  $\frac{1}{3}$  rd tetrahedral voids? 1

OR

Which crystal defect increases the density of a crystal?

- 2 Which of the following is most effective for the coagulation of  $\text{Fe}(\text{OH})_3$  sol and why?  $\text{NaCl}$ ,  $\text{CaSO}_4$ ,  $\text{Na}_3\text{PO}_4$ . 1

OR

Define shape selective catalysis

- 3 Give reason why  $\text{Ti}^{3+}$  is purple while  $\text{Ti}^{4+}$  is colorless. 1
- 4 Give the IUPAC name of the following compound 1  
 $\text{CH}_2=\text{CH}-\text{CH}_2-\text{CH}(\text{CH}_3)-\text{CH}_2-\text{Cl}$
- 5 Give one example each for Globular protein and Fibrous protein 1

**Section B**

- 6 The chemistry of corrosion of iron is essentially an electrochemical phenomenon. Give the anode, cathode and overall reactions during rusting. 2
- 7 a) The rate of a reaction  $2\text{NO} + \text{Cl}_2 \rightarrow 2\text{NOCl}$  is doubled when concentration of  $\text{Cl}_2$  is doubled and it becomes eight times when concentration of both  $\text{NO}$  and  $\text{Cl}_2$  are doubled. Deduce the order of the reaction. 2

- (b) For a reaction, the value of rate constant is  $3.2 \text{ mol}^{-1} \text{ L}^{-1} \text{ S}^{-1}$ . What is the order of the reaction
- 8 Draw the molecular structures of the following: 2
- (a) Noble gas species which is isostructural with  $\text{BrO}_3^-$
- (b) Dibasic oxoacid of phosphorous

OR

Arrange in the **increasing order** of property indicated

a)  $\text{HOCl}$ ,  $\text{HOClO}$ ,  $\text{HOClO}_2$ ,  $\text{HOClO}_3$  - Acid strength

b)  $\text{NH}_3$ ,  $\text{PH}_3$ ,  $\text{AsH}_3$ ,  $\text{SbH}_3$  - Bond angle

- 9 Complete the following Equations 2



- 10 Give reasons for the following 2

a) Nitrophenols are more acidic while cresols are less acidic than phenol

b) Alkyl aryl ethers on cleavage with hydrogen halide give phenol and alkyl halide and not aryl halide and alcohol. Why?

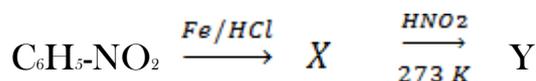
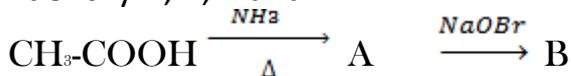
OR

How will you convert

a) Propene to propan-2-ol

b) Ethyl magnesium chloride to propan-1-ol

- 11 Identify A, B, X and Y 2



- 12 Write the equations involved in the following reactions 2

1) Hinsberg test (only for primary amines)

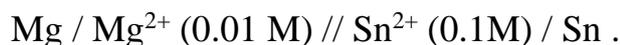
2) Carbylamine test

### Section C

- 13 What is the distance between  $\text{Na}^+$  and  $\text{Cl}^-$  in NaCl 3

Crystal if its density is  $2.165 \text{ g cm}^{-3}$  (MM of NaCl is 58.5g)

- 14 Calculate the cell emf at  $25^\circ\text{C}$  for the following cell 3



(Given  $E^0_{\text{Mg}^{2+}/\text{Mg}} = -2.34 \text{ V}$   $E^0_{\text{Sn}^{2+}/\text{Sn}} = -0.136 \text{ V}$ ).

Calculate the maximum work that can be accomplished by the operation of this cell.

- 15 a) When a graph plotted between  $\log k$  and  $1/T$ , then slope value obtained is  $-5841$ . Calculate the activation energy 3
- b) The first order reaction is 20% completed in 20 minutes. Calculate the time taken for 80% completion .

OR

The rate of a reaction quadruples when the temperature changes from 293K to 313K .Calculate the energy of activation of the reaction .

- 16 Explain what is observed when 3
- a) An electric current is passed through a sol  
b) A beam of light is passed through a sol  
c) NaCl is added to ferric hydroxide sol
- 17 Write the role of 3
- a)  $I_2$  , in the van Arkel method of refining  
b) Cryolite in the extraction of Al  
c) Dil NaCN in the Extraction of Ag

- 18 3
- A translucent **white** waxy solid (**A**) on heating in an inert atmosphere is converted into its allotropic form (**B**) . Allotrope (**A**) on reacting with very dil aq.KOH liberates a highly poisonous gas (**C**) having rotten fish smell. With excess of chlorine (**A**) forms (**D**) which hydrolyse to compound (**E**) . Identify A to E and also draw the structure of A.

OR

- (a) Account for the following:
- (i) Sulphur in vapour state exhibits paramagnetism.  
(ii)  $PCl_5$  is known but  $NCl_5$  is not known.  
(iii) Halogens are strong oxidizing agents.
- 19 Write the hybridisation and shape of the following complexes 3
- 1)  $[CoF_6]^{3-}$                       2)  $[Ni(CN)_4]^{2-}$   
b) Out of  $NH_3$  and CO which ligand form a more stable complex and why

OR

a) With the help of a neat labelled diagram explain the crystal field splitting in octahedral coordination complexes

- b) Explain the term **Ambidentate** ligand with an example
- 20 Which halogen compound in each of the following pairs will react faster in  $S_N^2$  reaction and why? 3
- a) **CH<sub>3</sub>Br** or **CH<sub>3</sub>I**  
 b) **(CH<sub>3</sub>)<sub>3</sub>C-Cl** or **CH<sub>3</sub>-CH(Cl)-CH<sub>3</sub>**  
 c) Complete and name the following reaction  
 $CH_3-CH_2Br + AgF \longrightarrow ? + ?$
- 21 a) Distinguish between the following pairs by suitable chemical tests 3
- 1) Phenols and cyclohexanol  
 2) **CH<sub>3</sub>-CH<sub>2</sub>-OH** and **CH<sub>3</sub>OH**
- b) Write the mechanism of acid catalysed dehydration of Alcohols
- OR**
- An alcohol **A (C<sub>4</sub>H<sub>10</sub>O)** on oxidation with acidified potassium dichromate gives acid **B (C<sub>4</sub>H<sub>8</sub>O<sub>2</sub>)**. Compound **A** when dehydrated with conc. **H<sub>2</sub>SO<sub>4</sub>** at **443 K** gives compound **C**. Treatment of **C** with aqueous **H<sub>2</sub>SO<sub>4</sub>** gives compound **D (C<sub>4</sub>H<sub>10</sub>O)** which is an isomer of **A**. Compound **D** is resistant to oxidation but compound **A** can be easily oxidised. Identify **A, B, C and D**. Name the type of isomerism exhibited by **A** and **D**
- 22 What happens when D glucose is treated with 3  
 a) **HI** b) **Bromine water**  
 b) Write any two differences between **DNA** and **RNA**
- 23 a) Write names and structures of the monomers of following polymers 1) **Nylon6,6** 2) **Terylene** 3  
 b) What is meant by copolymerisation?
- 24 a) Pick out the odd one from the following 3  
 Equanil, Veronal, Aspirin, Barbituric acid
- b) What are the differences between cationic and anionic detergents. Illustrate with one example each

### Section D

25 a) An antifreeze solution is prepared from 222.6 g of glycol ( $C_2H_6O_2$ ) and 200 g of water. Calculate the molality of the solution. If the density of the solution is  $1.072\text{g/L}$  then what shall be the molarity of the solution ?

(b) Define ebullioscopic constant

(c) Mention one application of Henry's law

OR

a) What is van't Hoff factor? What possible values can it have if the molecules undergo dissociation

b) An aqueous solution containing 12.48 g of  $BaCl_2$  in 1.0 kg of water boils at  $373.0832\text{K}$ . Calculate the degree of dissociation of  $BaCl_2$ . ( $K_b$  for  $H_2O$  is  $0.52\text{K m}^{-1}$ )

(Molar mass of  $BaCl_2$  is  $208.34\text{g}$ )

26 a) Indicate the steps in the preparation of  $K_2Cr_2O_7$  from chromite ore

b) Compare the Chemistry of Lanthanoids and Actinoids with special reference to 1) Electronic configuration 2) Oxidation state

OR

1) Calculate the magnetic moment of divalent ion in aq. solution if its atomic number is 26

2) Although 'F' is more electronegative than 'O', the highest Mn fluoride is  $MnF_4$ , whereas the highest oxide is  $Mn_2O_7$ . Why?

3) Give reason

(a) Transition metals form coloured ions

(b) Transition metals form large number of complexes

(c) Transition metals show catalytic properties

27 An organic compound (A) with molecular formula  $C_8H_8O$  forms an orange red precipitate with 2,4, DNP reagent, and gives yellow precipitate on heating with iodine in the presence of  $NaOH$ . It neither reduces Tollens or Fehling's reagent, nor it decolourises bromine water or Baeyer's reagent. On drastic oxidation with chromic acid it gives carboxylic acid (B) having molecular formula  $C_7H_6O_2$ . Identify the compound (A) and (B) and explain the reaction involved. )

OR

Write chemical equation to illustrate the following

a) Wolf-Kishner reduction.

b) Cannizzaro reaction

c) Draw the structure of the compound 4-Bromo-3-methyl heptanal.

(d) Which among the following undergo aldol condensation:

Benzaldehyde or 2-methyl pentanal? Justify the answer.

e) Write the structure of the product of the reaction:

