

MAR THOMA RESIDENTIAL SCHOOL TIRUVALLA

SECOND MODEL EXAMINATION 2019-2020

CHEMISTRY (12)

PAPER- 1

[THEORY]

[MAXIMUM MARKS: 70]

[TIME ALLOWED: THREE HOURS]

[Candidates are allowed additional 15 minutes for only reading the paper.

They must not start writing during this time]

ALL QUESTIONS ARE COMPULSORY

QUESTION 1 is of 20 marks all of which are compulsory

QUESTION numbers from 2 to 8 is of two marks each.

QUESTION numbers from 9 to 15 is of three marks each.

QUESTION numbers from 16 to 18 is of five marks each.

All working including rough work should be done on the same sheet as and adjacent to the rest of the answer. The intended marks for questions are given in brackets []. Balanced equation must be given wherever possible and diagrams where they are helpful. When solving numerical problems all essential working must be shown. For solving numerical the following data can be used

1 Faraday = 96500 coulombs, $h = 6.626 \times 10^{-34} \text{Kgm}^2\text{s}^{-1}$,

$R=8.314\text{J/K/mol}, 0.0821\text{Latm/K/mol}, 0.083\text{Lbar/K/mol}$ 1.987 cal/K/mol

Avogadro no: 6.022×10^{23}

PART 1

QUESTION 1

(a) Fill in the blanks

- (i) Sodium chloride is a ----- crystal and the coordination number of each ion is-----
- (ii) The free energy change for a galvanic cell is----- as it is -----
- (iii) Aniline reacts with benzoyl chloride in presence of aqueous sodium hydroxide to form ----- and the reaction is called-----.
- (iv) Monomers of nylon 6,6 are ----- and -----.

(b) Choose the correct option

- (i) Which one of the following defect does not affect the density of the crystal
 - (a) Schottky defect
 - (b) Frenkel defect
 - (c) Interstitial defect
 - (d) (b) and(c)
- (ii) Solution of liquid in solid is called
 - (a) Emulsion
 - (b) Foam
 - (c) Gel
 - (d) Sol
- (iii) Among the following the most *basic* compound is:
 - (a) Benzyl amine
 - (b) Aniline
 - (c) Acetanilide
 - (d) P-nitroaniline
- (iv) S_N2 reaction is faster in
 - (a) Ethyl bromide
 - (b) Ethyl iodide
 - (c) Ethyl chloride
 - (d) Ethyl fluoride

(c) Match the following

- | | |
|------------------------|-------------------|
| (i) Zero order | germanium |
| (ii) First order | mol/L/sec |
| (iii) Van Arkel method | zirconium |
| (iv) Zone refining | sec ⁻¹ |

(d) Answer the following

(i) Explain why:

(a) Ethyl amine is soluble in water whereas aniline is not

(b) Aliphatic amines are stronger bases than aromatic amines

(ii) What do you mean by half life of a reaction?

How does it vary against initial concentration for a first order reaction

(iii) What do you mean by abnormal molecular mass

Arrange the following in increasing order of osmotic pressure and justify your answer.

34.2g/L of sucrose, 60g/L of urea, 90g/L of glucose, 58.5 g/L of NaCl.

(iv) Differentiate between antihistamine and antacid. Give an example of each

QUESTION 2

What are artificial sweetening agent? Name the sweetening agent used in preparation of sweets for diabetic patients

QUESTION 3

(A) Explain why:

- (i) Actinoid contraction is greater than lanthanoid contraction from element to element.

(ii) Copper salts are coloured but zinc salts are colourless.

Or

(B) Define pyrometallurgy? What is the significance of leaching in the extraction of aluminium?

QUESTION 4

How will you convert

(a) Toluene to benzyl alcohol

(b) Bromomethane to fluoromethane

QUESTION 5

Define

(i) Flocculation value (ii) Electro osmosis

QUESTION 6

What is the difference between ferromagnetic and antiferromagnetic substance

Out of these which shows permanent magnetism and why?

QUESTION 7

Give the IUPAC name for the following

(a) $\text{Na}_4[\text{Fe}(\text{CN})_6]$

(b) $[\text{Cr}(\text{en})_3]^{3+}$

QUESTION 8

(A) Write the steps involved in the extraction of potassium dichromate from chromite ore

Or

(B) Give balanced equation

(i) Acidified potassium dichromate with hydrogen sulphide

(ii) Acidified potassium permanganate with oxalic acid.

QUESTION 9

Give balanced equation

- (i) Cumene to phenol
- (ii) Ethyl magnesium chloride to propanol
- (iii) Nitration of ethoxy benzene

QUESTION 10

(A)(i) Write the formulae of the following compounds

(a) Iron(III) hexacyanoferrate (II)

(b) Hexaammine cobalt(III)sulphate

(ii) What type of isomerism is exhibited by $[\text{Co}(\text{NH}_3)_5\text{NO}_2]^{2+}$. Give its isome

Or

(B)(i) Mention the hybridization and geometry of $[\text{Fe}(\text{CO})_5]$

(ii) Explain

(a) Low spin tetrahedral complexes are not found

(b) $[\text{Cu}(\text{NH}_3)_4]^{2+}$ is coloured while $[\text{Cu}(\text{CN})_4]^{2-}$ is colourless.

QUESTION 11

The following data were obtained at 303K for the reaction $\text{A} + \text{B} \longrightarrow \text{C} + \text{D}$

Expt	[A]	[B]	initial rate mol/L/m
1	0.1	0.1	6×10^{-3}
2	0.3	0.2	7.2×10^{-2}
3	0.3	0.4	2.88×10^{-1}
4	0.4	0.1	2.4×10^{-2}

What is the order with respect to each reactant and overall order, give the rate law and calculate rate constant with its units

QUESTION 12

(A) A current of 2 ampere was passed for 5 hours through a molten metal salt deposited 22.5g of metal. (At. mass is 177). What is the oxidation state of the metal. State the law behind

Or

(A) What is a fuel cell? Give the reaction at the cathode and anode of fuel cell

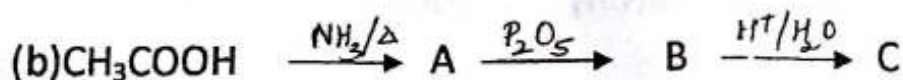
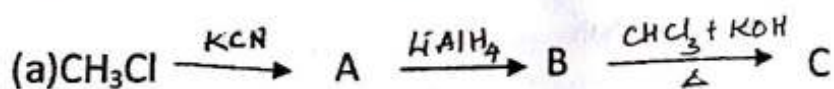
QUESTION 13

Write the balanced chemical equation and name the reaction

- Benzamide treated with bromine and alc. KOH
- Ethanal treated with dilute caustic potash.

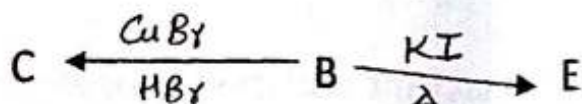
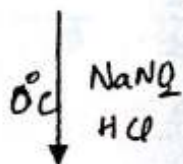
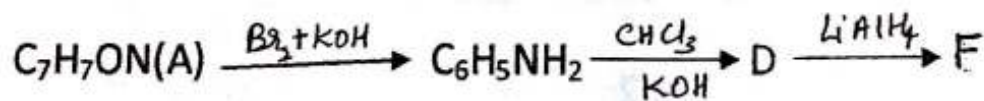
QUESTION 14

Write structures of A, B, C



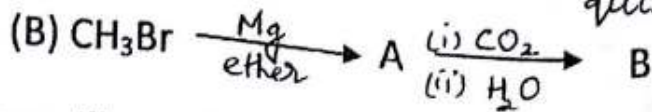
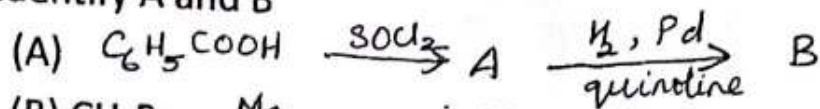
QUESTION 15

An aromatic compound A of molecular formula $\text{C}_7\text{H}_7\text{ON}$ undergoes a series of reactions as shown below. Write the structures of A, B, C, D, E, and F



QUESTION 16

(A)(i) Identify A and B



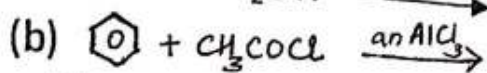
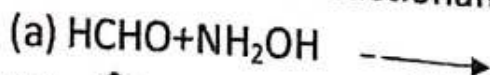
(ii) How will you distinguish between

- (a) Propanal and propanone
- (b) Formic acid and acetic acid

(iii) Give chemical equation for wolf-kishner reduction

Or

(B)(i) Complete the reaction and name the products:



(ii) Account for the following

- (a) Chloroacetic acid is stronger than acetic acid
- (b) Carboxylic acid have higher boiling point than alcohols of comparable molecular mass
- (c) Acetaldehyde is more reactive with HCN than acetone

QUESTION 17

(A)(i) Account for the following :-

- (a) Ammonia has higher boiling point than phosphine.
 - (b) ClF_3 exist but FCl_3 doesnot.
 - (c) Silent electric discharge is used for conversion of oxygen to ozone.
- (ii) Give the balanced equation
- (a) Mercury treated with ozone
 - (b) Sulphur dioxide treated with chlorine.

Or

(B) (a) Draw the structure of pyrosulphuric acid

(b) Give reasons:

(i) Atomic radius of noble gases is high when compared to other elements in that period.

(ii) Xenon forms maximum number of compounds with fluorine and oxygen

(iii) White phosphorus is highly reactive when compared to red phosphorous

(iv) Halogens are coloured.

QUESTION 18

(A) (i) What do you mean by Vanthoff factor and isotonic solution

(ii) 17.4% K_2SO_4 solution at $27^\circ C$ is isotonic with 4% NaOH solution at same temperature. If NaOH is 100% ionize what is the degree of ionization of K_2SO_4 in aqueous solution. [K=39, O=16, H=1, Na=23, S=32]

Or

(B) (a) State Raoult's law in terms of elevation in boiling point.

(b) Calculate boiling point of a solution containing 25g of urea (NH_2CONH_2) and 25g of thiourea (NH_2CSNH_2) in 500g chloroform $CHCl_3$. The boiling point of pure chloroform is $61.2^\circ C$. $K_b = 3.63 \text{ km}^{-1}$. [N=14, C=12, S=32]

(c) What is the mole fraction of 0.5m ^{Cane sugar in} canesugar.

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