VINAYAK CLASSES
DEGREE & DIPLOMA ENGINEERING

Sub: Chemistry

Standard: 12th (Science) **Date:25.01.2019**
Time : 3 Hours **Total Marks: 70**

Note:

1) All questions are compulsory.
2) **Section-A** contains Q.No.1 to 4 of Multiple Choice type of questions carrying **one** mark each. Q.No.5 to 8 of Very short Answer type of questions carrying one mark each.
3) **Section B** contains Q.No.9 to 15 of Short Answer type questions carrying **two** marks each. Internal choice is provided to only one question.
4) **Section C** contains Q.No.16 to 26 of Short Answer type questions carrying **three** marks each. Internal choice is provided to only one question.
5) **Section D** contains Q.No.27 to 29 of Long Answer type questions carrying **five** marks each. Internal choice is provided to each questions.
6) Use of log-table, if necessary is allowed. Use of calculator is not allowed.

Section-A (8 marks)

Q.1 Meprobamate is used as

(a) Tranquilizers (b) Antibiotics (c) Antifertility drug (d) Antiseptic

Q.2 The polymer used in human hair wigs is

(a) Kelvar (b) Dynel (c) Saran (d) Lexan

Q.3 Half life of a 1st order reaction is 693 s. Its rate constant will be

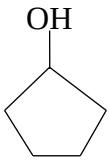
(a) 0.01 s^{-1} (b) 0.1 s^{-1} (c) 0.001 s^{-1} (d) 1.0 s^{-1}

Q.4 The charge of how many coulomb is required to deposit 1 g of sodium metal (Molar mass 23 g mol^{-1}) from sodium ion is

(a) 2098 (b) 96500 (c) 193000 (d) 4196

Q.5 Nitrogen is much less reactive than phosphorus. Why?

Q.6 Recognize the reactant in the given reaction.

$$Reactant\ (A) \xrightarrow[413\ K]{Raney\ Ni, H_2}$$ 

Q.7 $(CH_3)_2NH$ is more basic than $(CH_3)_3N$ in an aqueous solution. Explain

Q.8 Three moles of an ideal gas are expanded isothermally form 0.3L to 2.5 L at 300 K against a pressure of 1.9 atm. Calculate the work done in L. atm

Section-B (14 marks)

Q.9 What is the molar mass of the metal, if fcc crystal structure of the metal has length of unit is 410 pm? (Density of the metal $= 2.7\ gcm^{-3}\ and\ N_A = 6.022 \times 10^{23}\ atom\ mol^{-1}$)

Q.10 Express the relation between depression in freezing point and molar mass of solute.

Q.11 Why do lanthanoids form coloured compounds?

Q.12 Explain ion exchange isomerism? Give the structure of trans isomer of $[CoCl_2(en)_2]^+$.

Q.13 Starting from bromoethane, how will you obtain-

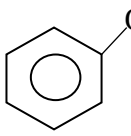
(a) A higher alkane? (b) An organometallic compound?

Q.14 Prepare benzoic acid from- (a) Acid amide (b) Acid chloride

OR

Q.14 Identify the product of following reactions:

$$(a) 2H - \overset{\overset{O}{\|}}{C} - H \xrightarrow{Conc.KOH} ?$$

(b) 

$\xrightarrow[273 - 283\ K]{HNO_3/H_2SO_4}$

Q.15 Write the structures of nucleoside and nucleotide.

Section-C (33 marks)

Q.16 Write the IUPAC name of. $CH_3 - \underset{\underset{OH}{|}}{CH} - CH_2 - COOH$

Illustrate the following name reactions giving suitable example of each.

(a) Clemmensen reduction (b) Hell Volhard- Zelinsky reaction.

Q.17 Give two limitations of valence bond theory.

Select the compound in each of the following pairs which reacts faster in SN^2 reaction with OH^-?

(a) $CH_3Br\ (or) CH_3I$ (b) $(CH_3)_3C-Cl\ (or) CH_3Cl$

Q.18 Predict the shape and angle in each of the following cases (Explain angle: 90^0 or more or less)

(i) $SO_3^{2-}$and the angle $O-S-O$

(ii) $ClF_3\ and\ the\ angle\ F-Cl-F$

(iii) $XeF_2\ and\ the\ angle\ F-Xe-F$

Q.19 Calculate C-Cl bond enthalpy from the reaction, $CH_{4(g)}+Cl_{2(g)}\rightarrow CH_3Cl_{(g)}+HCl_{(g)}\Delta H^0=-104\ kJ$

(Given:$\Delta H^0_{(C-H)}=410\ kJmol^{-1}, \Delta H^0_{(Cl-Cl)}=240\ kJmol^{-1}, \Delta H^0_{(H-Cl)}=430\ kJmol^{-1}$)

Q.20 Calculate, using Nernst equation, cell potential of the following electrochemical cell at 298 K

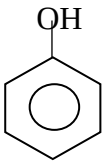
$$Zn_{(s)}\left|\underset{(0.04\ M)}{Zn^{++}}\right|\left|\underset{(0.03\ M)}{Sn^{2+}}\right|Sn_{(s)}(\ Given: E^0_{zn}=-0.76\ V, E^0_{Sn}=-0.14\ V)$$

Q.21 Distinguish between primary and secondary amines from tertiary amines by acylation.

Q.22 Explain the process of electrometallurgy.

Q.23 How are polymers classified, on the basis of polymerisation process? What is meant by 'disproportionation'?

Q.24 Identify the major products in the given equation.

(i) $CH_3CH_2OH \xrightarrow{PCl_5}?$ (ii) 

$+CH_3Cl \xrightarrow{anhy.AlCl_3}?$

(iii) $CH_3-Cl+CH_3-CH_2-ONa\rightarrow?$

Q.25 In a first order reaction, $A\rightarrow B$, in half an hour, the given sample of the compound got reduced to 25% of its initial concentration. Find the half life of the reaction.

Q.26 1g of a non-electrolyte solute when dissolved in 50 g of benzene lowered the freezing point of benzne by 0.40 K. Find the molar mass of the solute ($K_f\ for\ benzene = 5.12\ K\ kg\ mol^{-1}$)

OR

Q.26 A 5% solution (by mass) of cane-sugar (Molecular weight= 342) is isotonic with 0.877% solution of substance X. Find the molecular weight of X.

Section-D (15 marks)

Q.27 Depict the galvanic cell in which the cell reaction is $Cu + 2Ag^{+} \rightarrow 2Ag + Cu^{2+}$
How is nitric acid prepared by Ostwald's process?
Give the preparation of aspirin and mention two uses of it.

OR

Q.27 Write the cell representation of lead accumulators.
What happens when ozone gas is passed through the neutral solution of KI? Mention two important uses of ozone.
Explain antiseptics with examples.

Q.28 Find whether a chemical reaction with $\Delta H = -70\ kJ\ and\ \Delta S = -160\ JK^{-1}$ at a temperature of 520 K is spontaneous or non-spontaneous and exothermic or endothermic. Represent the box type outer electronic configuration of sulphur to justify its oxidation states like $-2, +2, +4, +6$. Suggest reason for " the transition metals and their compounds are usually paramagnetic."

OR

Q.28 Suggest reason for, "the transition metals exhibit variable oxidation state."
For a certain reaction, $\Delta H = 25\ kJ\ and\ \Delta S = 45\ J. At$ what temperature will it change from spontaneous to non-spontaneous?
What is the action of chlorine in presence of sunlight on-

(a) Sulphur dioxide (b) Carbon monoxide?

Q.29 What is ferromagnetism? Explain n-type of semiconductor.
What is the action of $NH_2OH\ and\ dil. HNO_3$ on glucose?
Name the member of lanthanoid series which is well known to exhibit +4 oxidation stat.

OR

Q.29 Classify the following semiconducters into n or p-type.

(a) B doped with Si (b) As doped with Si

(c) P doped with Si (d) Ge doped with In

Write a note on secondary structure of proteins.

Why Zn is not considered as a transition element.