

## MANIPAL UNIVERSITY Department of Chemistry. MIT. Manipal



## II SEMESTER B.E DEGREE EXAMINATION ENGG CHEMISTRY (CHM 101)

Time : 3hr	15-05-2009	Max.Marks : 50

## Note: Answer any **FIVE** full questions.

- 1.A i) Give reasons for the following:
  - a) The e.m.f of a galvanic cell is always positive and never greater than 2 Volts.

b) For a given reduction reaction, higher the concentration of electrolyte, lower will be the reduction potential and vise versa.

1.B i)Represent a galvanic cell and write electrode reactions for the following cell reaction: Zn (s) + 2AgCl ----→ 2Ag + ZnCl<sub>2</sub>
ii) Write two differences between number average and weight average molecular

weight. iii) In a sample of polystyrene, polymers of different degree of polymerization are

in the ratio of 2: 3: 4: 6. The degree of polymerization of the samples are 345, 570, 800 and 925 respectively. Calculate number average and weight average molecular weight. (Given: atomic wt of C = 12 and H = 1)

1.C i) Compare the composition of producer gas and water gas. Which is the better fuel and why?

ii) Explain in detail any two factors affecting the nature of electrodeposit .

[2 + 4 + 4 = 10M]

2.A i) Give reasons for the following:

a) Maintenance free batteries are preferred to lead storage cell.

b) A membrane must be placed adjacent to the cathode in a methanol- oxygen fuel cell.

2.B i) For a electrochemical cell

Cd,CdCl<sub>2</sub> 5/2  $H_2O/AgCl(s)$ ,Ag the e.m.f at 0°C and 25°C is 0.6915V and 0.6753V respectively. Calculate standard free energy, enthalpy and entropy change.

ii)Explaining the passivating nature of metal & discuss anodic protection of metals.

2.C i) With relevant structure, explain the variation in glass transition temperature in polythene, polyvinyl chloride, polystyrene and  $\dot{\alpha}$  methyl polystyrene.

[2 + 4 + 4 = 10M]

3.A i) Give reasons for the following:a) Water fed to the boiler during steam generation must be deionized

b) Corrosion can not be controlled effectively, if inadequate amount of anodic inhibitor is present in the corrosive environment.

3.B i) In a concentration cell, Ag electrodes are immersed in different concentrations of AgNO<sub>3</sub>. Concentration of AgNO<sub>3</sub> in the anodic compartment is 0.05M. Calculate the strength of AgNO<sub>3</sub> in the cathodic compartment.( Given: E.M.F of the cell is 0.25V.) When would the e.m.f of this cell become zero?
ii) Differentiate between concentration and activation polarization. Discuss the

11) Differentiate between concentration and activation polarization. Discuss the mechanism of activation polarization.

- 3.C i) By giving appropriate reasons, write any one application of nylon 6,6, Teflon, SBR and epoxy resin.
  ii) Write a note on compounding of rubber. [2+4+4=10M]
- 4.A i) Give reasons for the following :a) TEL along with ethylene dibromide reduces the knocking tendency of gasoline used in I.C engines.

b) Petroleum cracking and reforming increases the yield and the quality of gasoline.

4.B i) With a suitable example, explain the differential aeration corrosion. How is it different from galvanic corrosion?

ii) Give the principle of anode and cathode metal coating. Write two limitations of cathode metal coating.

4.C i) Give the construction of Ni-Cad cell. Write the electrode reaction and cell reaction of the same during discharge of the cell. Comment of the strength of electrolyte at the end of the discharge process.

ii) A bomb calorimeter experiment using 0.8g of coal gave the gross calorific value 3781.25 cal .g<sup>-1</sup>, by showing an increase in temperature of 2.2°C. The weight of water taken in the calorimeter was 1250g. Calculate the water equivalent of the calorimeter. If the coal sample contains 5.2% of hydrogen, Calculate the net calorific value. [2+4+4=10M]

- 5.A i) Give reasons for the following:
  a) Electroplating of chromium is carried out using inert electrodes.
  b) Silicone rubber connet be unleaving on physical physic
  - b) Silicone rubber cannot be vulcanized using sulphur.
- 5.B i) With relevant principle and required calculation steps explain ultimate analysis of coal for the determination of % C & H.

ii) Compare and contrast suspension and emulsion polymerization.

- 5.C i) Why glass electrode is known as indicator electrode? Derive an expression for glass electrode potential.
  - ii) Discuss in detail any two applications of fuel cell. [2+4+4=10 M]
- 6.A i) Give reasons for the following:a) Hydrogen electrode can not be used when the electrolyte contains redox reagents and impurities.

b) .Isotactic and syndiotactc polymers are hard but atactic polymers are soft.

- 6.B. i) Explain the principle of electroless plating. Why is it better than electroplating?ii) Define a standard cell. Explain the determination of e.m. f . of a cell.
- 6.C i) How does electrochemical theory of corrosion explain the formation of yellow and black rust.

ii) Write 4 differences between addition and condensation polymerization.

[2+4+4=10M]

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