MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

B.TECH. END SEMESTER MAKE-UP EXAMINATION

SUBJECT: ENGG.CHEMISTRY CHM1051

Time: 2 Hours **Date: 02/09/2021** **Max. Marks: 40**

Note: Answer any four questions.

Write diagrams or equations or examples wherever necessary.

1A. Explain the construction and working of nickel cadmium battery and proton exchange membrane fuel cell. Why lead-acid battery should not be kept idle in partially charged conditions?

1B. Why does nylon-6,6 have more strength than polyethene? Calculate the number average and weight average molecular weights of polystyrene from the following data. Atomic weights of C and H are 12 and 1 amu respectively.

Degree of polymerization	150	200	350	400
Number of molecules	25	20	40	15

Define instant dipole – induced dipole forces.

(5+5)

2A. Discuss the origin of single electrode potential. Describe the construction and working of calomel electrode. Explain how it is employed in the determination of pH of a given solution?

2B. Differentiate between ionic bond and metallic bond. Write any two requirements to be satisfied by biomaterials used for vascular grafting. About 1.5 g of coal on combustion gave 0.520 g of CO_2 and 0.0230 g of H_2O and the same amount of coal when Kjeldalized, the evolved NH_3 gas was absorbed in 50.0 mL of 0.1 N H_2SO_4. After absorption, the excess acid required 6.0 mL of 0.1 N NaOH for exact neutralization. Calculate the percentage of carbon, hydrogen, and nitrogen in the coal sample.

(5+5)

3A. Explain intergranular corrosion in 18-8 stainless steel. Describe the anodic protection method used to protect a steel tank for the storage of sulfuric acid based on the concept of passivity of metals.

3B. Define the decomposition potential of an electrolyte. Explain the experimental determination of decomposition potential. When SCE is connected with Zn^{2+}(unknown) $|$ Zn, it produced an EMF of 1.05 V at 298 K. Calculate the concentration of zinc ions. E^0 of Zn^{2+} is –0.76 V and E_{SCE} is 0.2444V.

(5+5)

4A. Why average molecular weights are considered for polymers. Explain any four types of ceramics with a suitable example each.

4B. Differentiate between galvanic series and electrochemical series. The EMF of the cell: $Cd \mid CdCl_2$. 2.5 H_2O (saturated) $\mid\mid$ AgCl $\mid$ Ag is 0.6750 V and 0.6915 V at 298 K and 273 K respectively. Calculate the changes in enthalpy, free energy and entropy at 298 K.

(5+5)

5A. Differentiate between zero-dimensional nanomaterials and one dimensional nanomaterials. Describe the sol gel and ball milling methods for the preparation of nanomaterials.

5B. Why is corrosion of zinc faster than iron when in contact with copper? Why are chromium anodes not used in chromium electroplating? A solution of tryptophan has an absorbance of 0.50 at 280 nm in a 0.55 cm length cuvette in colorimetric analysis. Calculate the concentration of the solution if the absorption coefficient of tryptophan is 5.4×10^3 $Lmol^{-1}$ cm^{-1}. Write the four steps involved in precipitation methods.

(5+5)

6A. Name and explain two reactions involved in the reformation of petrol? Explain how liquid crystal materials are used in display systems. Why do linear polymers have lower Tg than cross linked polymers?

6B. Differentiate between electroplating and electroless plating of metals. A glass electrode dipped in a solution of pH = 4 offered an EMF of 0.2060 V with SCE at 298 K. Dipped in a solution of unknown pH, at the same temperature in contact with SCE recorded an EMF of 0.1070 V. Calculate the pH of the solution if E_{SCE}=0.2444 V. Explain why normal glass electrode can be employed only for measuring pH values in the range 0-10.

(5+5)

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