Question Paper

Exam Date & Time: 11-Jan-2023 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FIRST SEMESTER B.TECH. EXAMINATIONS - JANUARY 2023
SUBJECT: CHM 1071 / CHM-1071 - ENGINEERING CHEMISTRY

Marks: 50 **Duration: 180 mins.**

Answer all the questions.

1A) The EMF of the cell having Ni and Cu as the electrodes in contact with their respective electrolytes $NiCl_2$ (1 M) and $CuCl_2$ (1 M) is 0.5832 V at 298 K and 0.6131 V at 273 K. Calculate ΔG, ΔH and ΔS for the reaction at 298 K. Write the cell representation and cell reaction. (4)

1B) Write the construction and working of Lithium ion batteries. Write any two disadvantages of PEMFC. Why ambient air is not a preferred oxidant in AFC? (4)

1C) Identify and explain the best suited cleaning method before electroplating for the following cases: (2)
i) Heavy scales of oxides on base metal.
ii) Metal covered with oil, grease and superficial dirt.

2A) i) Explain the conductometric titration of strong acid with a weak base with the appropriate graph. (4)
ii) A substance in aqueous solution of concentration 10^{-3} M absorbs 10% of an incident light in a path of length 1 cm. Calculate the concentration required to absorb 90% of the incident light.
(2+2 = 4 marks)

2B) i) Write the balanced chemical equation for the formation of scum when soap is added to water. (4)
Give reason: The water softened by boiling turns in to hard water upon leaving for long time without removing the precipitate.
ii) What is temporary hardness of water? Explain the removal of temporary hardness of water.
(2+2 = 4 marks)

2C) Give any two advantages and disadvantages of lime soda process. (2)

3A) Explain bimetallic corrosion with an example. Describe how the relative electrode potentials of metal affect the rate of corrosion. (4)

3B) Define the term passivity. Explain the anodic protection method for preventing the corrosion of steel tanks containing sulphuric acid. Mention any two of its advantages and disadvantages. (4)

3C) Justify the following statements: (2)
i) The corrosion rate of metal in the presence of dissolved gases is faster at room temperature than at higher temperatures.
ii) Anodic inhibitors are effective if the added concentration is above the critical concentration.

4A) i) Explain fibre reinforced composites. (4)
ii) Write the classification of thermotropic liquid crystals based on shape.
(2+2 = 4 marks)

4B) i) Why nylon 6,6 is more crystalline than polystyrene. (4)
ii) The polymer sample has the following composition.

Degree of polymerization	200	300	400	500
% of composition	10	20	30	40

If the number average molecular weight of the sample is 11200. Calculate the weight average molecular weight and polydispersity index of the polymer sample.

(1+4 = 4 marks)

4C)	With a neat diagram explain the PVD process.	(2)
5A)	Define decomposition potential of an electrolyte. Describe the experimental setup and procedure for determining it.	(4)
5B)	i) Give reasons for the following: a) Ionic compounds are soluble in polar solvents b) HF has higher boiling point than HCl ii) Define the following: a) London forces b) Metallic bond (2+2 = 4 marks)	(4)
5C)	Write a note on anodic inhibitors.	(2)

-----End-----