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CHE12/22

First /second Semester B.E. Degree Examination, June / July 08
Engineering Chemistry

Time: 3 hrs.

Max. Marks:100

Note : Answer any FIVE full questions.

- 1 a. How do you distinguish a solid, a liquid crystal and an isotropic liquid phase of a long chain organic compound? (04 Marks)
- b. Explain the chemical constitution and liquid crystalline behaviour of PAA and MBBA compounds. (08 Marks)
- c. What is Biosurfactant? Write a brief note on industrial applications of enzymes in animal feeds and beverages. (08 Marks)
- 2 a. What is chemical fuel? How are they classified? (06 Marks)
- b. Define calorific value of a fuel. Explain how the calorific value of a solid fuel can be determined using bomb calorimeter. (08 Marks)
- c. A solid fuel weighing 0.98 g and containing 90% of carbon and 8% of hydrogen gave the following results in a bomb calorimeter experiment.
Amount of water taken in the calorimeter=1,450 g; Water equivalent of the calorimeter=450 g; Rise in temperature=1.8 °C. If the specific heat of water=4.18 kJ /kg /°C and the Latent heat of steam =587 × 4.187 kJ /kg, calculate the gross and net calorific value of a fuel. (06 Marks)
- 3 a. Define single electrode potential. Derive Nernst equation for copper electrode. (08 Marks)
- b. An electrochemical cell is obtained by coupling two dissimilar electrodes, one of which has higher reduction potential than the other. If the standard reduction potentials of copper and silver are 0.34 and 0.80 Volts respectively; and the ionic concentrations at the interface of copper and silver are 0.020 M and 1M respectively, write the electrode reactions and calculate the emf of the cell at 298 K. (06 Marks)
- c. Discuss determination of pH using glass electrode. (06 Marks)
- 4 a. Discuss the construction and working of Zn – MnO₂ cell during the discharge of the cell. Mention its cell performance. (06 Marks)
- b. How are Fuel cells classified? Discuss the construction and working of a molten carbonate fuel cell and write their redox electrode reactions. (06 Marks)
- c. Discuss construction and working of lead – acid storage battery. (08 Marks)
- 5 a. What are corrosive inhibitors? Explain types of corrosive inhibitors with examples. (06 Marks)
- b. What are the factors affecting the rate of corrosion? (06 Marks)
- c. Explain what type of corrosion occurs when, - i) Screw and washer are made of different metals, ii) Presence of Na OH in mild steel boiler under stress, iii) Iron rod is partly covered by dust practically, iv) Bent steel rod exposed to a corrosive environment. (08 Marks)
- 6 a. Give the difference between electroplating and electroless plating and explain the electroless plating of Nickel. (08 Marks)
- b. Explain electroplating of copper. (06 Marks)
- c. Write a short notes on : i) Decomposition potential ii) Over voltage. (06 Marks)
- 7 a. What are the sources of oxides of sulphur? Mention their illustration, effects and any two methods of control. (08 Marks)
- b. Write short notes on green house effect and ozone depletion. (08 Marks)
- c. 25 cm³ of a sample of COD analysis was reacted with 15 cm³ of 0.2 N K₂Cr₂O₇ and the unreacted K₂Cr₂O₇ required 7.7 cm³ of 0.1 N ferrous ammonium sulphate (FAS). 15 cm³ of same K₂Cr₂O₇ and 25 cm³ of distilled water under the same condition as the sample requires 28.0 cm³ of 0.1 N FAS. What is the COD of the sample? (04 Marks)
- 8 a. What is glass transition temperature (T_g)? Explain any three factors influencing T_g and significances of T_g. (08 Marks)
- b. Describe the manufacture of bakelite and poly carbonate and mention their applications. (06 Marks)
- c. Write a short note on Adhesives. (06 Marks)