Total No. of Printed Pages:2

F.E. Semester- I (Revised Course 2019-20)
EXAMINATION MARCH 2021
Chemistry

[Duration : Two Hours] **Total Marks :60**

Instructions:
1. Answer THREE FULL QUESTIONS with ONE QUESTION FROM EACH PART.
2. Draw diagrams wherever necessary.
3. Assume additional data if required.

Part – A

Q.1
a) For the cell $Mg/Mg^{2+}{}_{(0.01M)}\,//Ag^{+}_{(0.1M)}/\,Ag$ write the cell reaction and calculate the EMF of the cell at 298K if the standard electrode potentials of Ni and Ag electrodes are -2.37 V and 0.8 V respectively. (6 mks)
b) Describe the mechanism of corrosion of a metal placed in a humid environment of neutra pH. (6 mks)
c) Explain briefly 'cathodic protection' as a tool for corrosion protection. (4 mks)
d) State and explain any four characteristics of batteries. (4 mks)

Q.2
a) For the cell $X/X^{2+}{}_{(0.01M)}\,//\,KCl_{(saturated)}/\,Hg_2Cl_2, Hg\,, Pt$ .write the cell reaction and calculate the E^{o}_{X} at 298K , where 'X' is an unknown element. The Ecell value was found to be 0.06. Data: $E_{calomel} = 0.2422\ V$. (6 mks)
b) Describe the mechanism of corrosion of a metal placed in a dry atmosphere. (6 mks)
c) Draw a neat labeled diagram for Zn-Air Battery and write the relevant reaction involved in its functioning. (4 mks)
d) Explain briefly Corrosion protection through environmental modifications. (4 mks)

Q.3
a) Explain the method for determination of pH of given solution using Glass Electrode. Write the cell representation of the resultant cell and derive the relationship between pH and EMF of the cell. (6 mks)
b) Explain any three factors each i.e. due to metal and nature of environment which affect the rate of corrosion. (6 mks)
c) Draw a neat labeled diagram for Li-Ion battery and write the relevant reaction involved in its functioning. (4 mks)
d) Explain with help of neat labeled diagram construction of Ion selective electrode. (4 mks)

Part- B

Q.4
a) Discuss the following structure- property relationship in polymers: (6 mks)
   i) Chemical properties
   ii) Mechanical Properties
b) Outline the mechanism of Beckmann rearrangement and give one application for the (6 mks)

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same.

c) State the basic principle involved in working of UV-Vis and IR spectroscopy. (4 mks)
d) Explain the terms Enantiomers and Diastereomers with suitable examples. (4 mks)

Q.5
a) Explain the Bulk and suspension methods of polymerization. (6 mks)
b) Outline the mechanism of Reimer- Tiemann and give one application for the same. (6 mks)
c) With the help of a block diagram explain the working of Gas Chromatography. (4 mks)
d) Explain the grading of Gasoline and Diesel. (4 mks)

Q.6
a) Discuss briefly Projection Formulae's and Geometrical Isomerism in chemical structures. (6 mks)
b) Discuss the degradation in polymers due to oxidation and ESC. (6 mks)
c) State the principle behind operation of UV-Vis spectroscopy and Gas Chromatography. (4 mks)
d) Define the term 'Fuel', Outline its classification with suitable examples. (4 mks)

Part- C

Q. 7
a) An article upon cleaning after a period of over a year was found to have developed tiny pores of discoloration on its surface. Explain the type of corrosion the article has undergone with suitable examples and relevant reactions. (5 mks)
b) Define the term 'Electrode Potential'. Determine the electrode Potential of the following system; $Ag^{+}{}_{(0.01M)}/Ag$ at 25°C, E^{o} of $Ag^{+} = 0.8V$. (5 mks)
c) Discuss briefly the terms Chirality and Enantiomers. (5 mks)
d) Explain crystallinity in polymers with regard to Tg and Tm. (5 mks)

Q. 8
a) Explain the process of electro less plating a surface with Copper. Draw relevant diagram. (5 mks)
b) Outline the classification of polymers based on structure and response to heat and pressure. (5 mks)
c) Explain the thermal and environmental stress cracking degradation in polymers. (5 mks)
d) Draw a neat labeled diagram of Calomel electrode; write its representation and reaction involved. (5 mks)

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