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[5667]-104

F.E. EXAMINATION, 2019
ENGINEERING CHEMISTRY
(2015 PATTERN)

Time : Two Hours

Maximum Marks : 50

- N.B. :—**
- (i) Neat diagrams must be drawn wherever necessary.
 - (ii) Figures to the right indicate full marks.
 - (iii) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
 - (iv) Assume suitable data, if necessary.

1. (a) Explain boiler corrosion giving causes, reactions involved and preventive measures taken. [6]
- (b) Explain conductometric titration between weak acid and strong base with the help of titration curve and reaction. [3]
- (c) Describe the construction of glass electrode with figure and half cell representation. [3]

Or

2. (a) Draw a labelled block diagram of single beam spectrophotometer and explain the components involved. [6]
- (b) Explain any *three* principles of green chemistry with relevant examples. [3]

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- (c) 100 ml of a hard water sample requires 18 ml of 0.01 M EDTA solution. 100 ml of the same sample after boiling and filtration required 7 ml of the same EDTA solution. Calculate the total, temporary and permanent hardness of the water sample. [3]
3. (a) Explain the mechanism of free radical polymerization using suitable example. [6]
- (b) Explain how percentage moisture and percentage volatile matter is determined in proximate analysis of coal. [3]
- (c) The following observations were noted in a bomb calorimeter experiment — Mass of coal sample = 1.708 g; weight of water in calorimeter = 2000 g; water equivalent of calorimeter = 580 g; initial temperature = 23.252°C; final temperature = 26.773°C. Find the GCV of the coal sample. Also calculate the NCV if given coal contains 5% hydrogen. [3]

Or

4. (a) How is the percentage of carbon, hydrogen and sulphur determined in ultimate analysis of coal ? [6]
- (b) Differentiate between LDPE and HDPE with respect to preparation, properties and applications. [3]
- (c) Give the preparation, properties and applications of styrene-butadiene rubber (SBR). [3]

5. (a) What are the problems involved in storage and transportation of hydrogen ? Explain any *two* methods of hydrogen storage. [6]
- (b) Explain the structure, properties and applications of fullerene. [4]
- (c) What are the isotopes of carbon ? Give their applications. [3]

Or

6. (a) Differentiate between the structure, properties and applications of diamond and graphite. [6]
- (b) Give the preparation and applications of silane and germane. [4]
- (c) Explain the manufacture of hydrogen by steam reforming of methane. [3]
7. (a) Explain the hydrogen evolution and oxygen absorption mechanism of wet corrosion. [6]
- (b) Discuss any *four* factors affecting the rate of corrosion. [4]
- (c) Define galvanization. Explain the process involved with the help of a neat diagram. [3]

Or

8. (a) What is the principle of cathodic protection ? Explain cathodic protection using sacrificial anode and impressed current method. [6]
- (b) Write the mechanism of dry corrosion due to oxygen. What is Pilling-Bedworth ratio ? Give its significance. [4]
- (c) Explain electroplating with help of figure and reactions involved. [3]