

Total number of printed pages – 7

B. Tech
BSCC 2201

2nd YEAR SUPPLEMENTARY EXAMINATION – 2006

CHEMISTRY – II

Full Marks – 70

Time : 3 Hours

Answer question No. 1 which is compulsory and any five questions from the remaining questions.

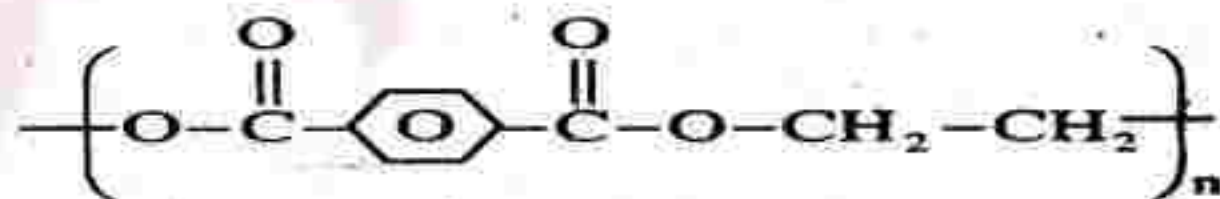
Answer all parts of a question at one place only.

The figures in the right hand margin indicate full marks for the questions.

1. Answer the following questions in brief : 2×10
- (a) What is standard hard water ?
 - (b) Why does zeolite-softened water help to prevent caustic embrittlement in boilers ?

P.T.O.

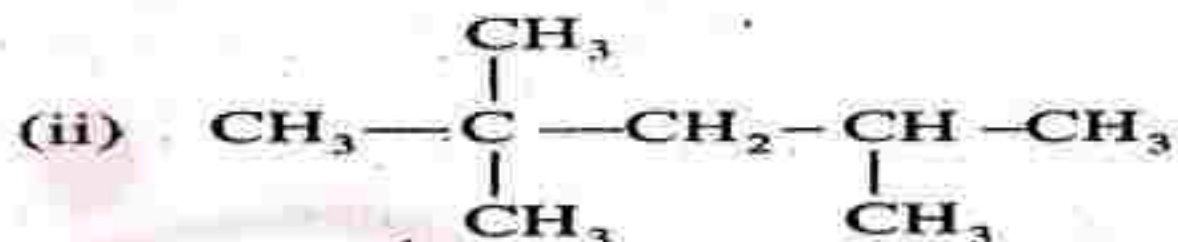
- (c) What are the conditions for wet corrosion to take place?
- (d) What is the weight of rust formed when 3.5 kg of iron have completely rusted away, if the composition of rust is ferric oxide monohydrate?
- (e) A polymer has the structure



Write the structure and name of the monomers.

- (f) What is the molecular mass of polystyrene if a single molecule has 2,000 monomers?
- (g) What is calorific value of a fuel? Arrange water gas, producer gas, bio gas, LPG in decreasing order of their calorific values.

(h) Which among the following hydrocarbons has higher octane rating and why ?



(i) How does CF_2Cl_2 deplete ozone layer ?

(j) What is the treatment for lead poisoning ?

2. (a) How can scale formation in boiler be prevented by (i) Phosphate conditioning
(ii) Calgon conditioning ? 4

(b) Explain briefly the various steps for the purification of water for municipal supply.

2

- (c) Calculate the permanent and total hardness of a sample of water containing the following impurities.

$\text{Mg}(\text{HCO}_3)_2 = 14.6 \text{ mg/L}$, $\text{CaSO}_4 = 27.2 \text{ mg/L}$

$\text{MgCl}_2 = 9.5 \text{ mg/L}$, $\text{CaCl}_2 = 22.0 \text{ mg/L}$. 4

3. (a) Discuss the principle of ion-exchange process for softening of hard water. 4

- (b) A sample of water gave the following constituents on analysis in ppm.

$\text{CaSO}_4 = 17.0$, $\text{Ca}(\text{HCO}_3)_2 = 40.0$, $\text{MgSO}_4 = 30.0$,

$\text{Mg}(\text{HCO}_3)_2 = 22.5$, $\text{NaCl} = 10.0$

Find the amount of lime (84% pure) and soda (92% pure) required for softening of 30,000 litres of the above water. 4

- (c) Write the structures of the monomers used for getting the following polymers : (i) PVC (ii) PMMA. Mention important uses of these polymers. 2

4. (a) Explain briefly the various factors affecting corrosion. 6
- (b) How is corrosion prevented by cathodic protection? 4

5. (a) Is the polymer $\left\{ \begin{array}{c} \text{CH} - \text{CH}_2 \\ | \\ \text{C}_6\text{H}_5 \end{array} \right\}_n$

a homopolymer or a copolymer? Is it an addition or condensation polymer? Explain.

2

- (b) Why does isobutylene undergo cationic polymerization easily? Write the mechanism of cationic polymerization of isobutylene using H_2SO_4 as catalyst. 4
- (c) Write equations for the synthesis of the following polymers: (i) Nylon 66, (ii) Polyurethane rubber. Mention important applications of these polymers. 4

6. (a) What are the requisites of metallurgical coke ?
Briefly discuss how coke is manufactured by
by-product oven process. 4
- (b) A gaseous fuel has the following percentage
composition by mass :
- $C_2H_6=4.0$, $C_3H_6=6.0$, $C_3H_8=12.5$, $C_4H_8=18.0$,
 $C_4H_{10}=42.0$, $CO_2=8.0$, $O_2=1.2$ and rest
 N_2 .
- Calculate the minimum volume of air required
at $25^\circ C$ and 1 atm. pressure for complete
combustion of 1 kg of the fuel. 4
- (c) What is vulcanization of rubber ? Show the
structural unit of vulcanized rubber. 2
7. (a) Outline the principle of refining of petro-
leum. Mention the important fractions
obtained and their uses. 6
- (b) How is water gas superior to producer gas as
a fuel ? 2

- (c) A sample of diesel has the same knocking characteristic as a 50 mL mixture of cetane and 1-methyl naphthalene mixed in ratio 3 : 2 by volume. What is the cetane number of the diesel sample ? 2
8. (a) Explain the terms BOD and COD. How are these determined ? 4
- (b) What is the cause of toxicity of mercury ? 2
- (c) What is green house effect ? Arrange the following gases in order of decreasing Global Warming Potential.
 CH_4 , N_2O , CO_2 , CFC. 2
- (d) What is the cause of acid rain ? How is it harmful to the environment ? 2