

END TERM EXAMINATION

FIRST SEMESTER [B.TECH.] - DECEMBER 2008

Paper Code: ETCH105

Paper ID: 99105

Time : 3 Hours

Subject: Applied Chemistry-I

(Batch: 2004-2006)

Maximum Marks : 75

Note: Q.No.1 is compulsory. Attempt any one question from each unit.

- Q.1 Write short notes on any five of the following. - (5x5)
- Specification of water for domestic use (drinking)
 - Manufacture of coke by Otto Hoffman oven
 - Boy's gas calorimeter
 - Acid rain
 - Disposal of radioactive hazardous waste
 - Sinks of air pollutants- CO_2 and H_2S .

UNIT-I

- Q.2
- Describe ion exchange method of softening water. (4)
 - Describe Calgon process of water softening. How does it differ from the soda process? (4)
 - Give the chemistry of formation of scales in boilers. How can it be prevented? (4.5)
- Q.3
- How are dissolved gases removed from water? (2)
 - What is colloidal conditioning? (2)
 - What causes 'hardness' of water? How is total hardness determined? Give the method and calculations. (4)
 - Describe permutit method of removing 'hardness' from water. How is used permutit regenerated? (4.5)

UNIT-II

- Q.4
- What is cracking and what is its significance? Explain the types of cracking. (4)
 - Explain the terms 'octane number' and 'cetane number'. Can any of these numbers have value higher than 100? Comment. (2,2)
 - What is proximate and ultimate analysis of coal? Explain its significance. (4.5)
- Q.5
- Describe Orsat method of flue gas analysis. (4)
 - A 500 mL gaseous mixture of CO , CO_2 , O_2 , N_2 and hydrocarbons when passed through the tubes containing solutions of KOH , alkaline pyroyallol, acidic Cu_2Cl_2 and bromine water measured 48.7, 48.2, 41.6 and 41.4 mL respectively. Calculate the percentages of oxides of carbon, oxygen and unsaturated hydrocarbons. (4)
 - Describe, giving schematic diagram, Bergius process of converting coal into synthetic petroleum. (4.5)

UNIT-III

- Q.6
- Describe how (i) chemical and (ii) biomedical waste is disposed off. (2,2)
 - Explain, how sanitary landfilling enables management of solid waste pollutants? (4)

- (c) What are soil pollutants? Explain, how use of pesticides in agriculture practices causes soil pollution. (4)

- Q.7 (a) Discuss any two types of environmental pollutants and name their sources. (4)
- (b) Describe major water pollutants and their sources. (4)
- (c) How is water, polluted with domestic and industrial waste, treated? Explain. (4.5)

UNIT-IV

- Q.8 (a) State Henry's law related to solubility of a gas in a liquid. Henry law constant for N_2 and O_2 in water at 298 K is 6.51×10^7 torr and 3.30×10^7 torr respectively. Calculate the ratio of N_2 and O_2 from air dissolved in water at that temperature, ratio of $N_2 : O_2$ in air is 4 : 1. (2, 2)
- (b) State Raoult's law. Describe the behaviour of an ideal solution with reference to this law. (4)
- (c) Explain with the aid of atleast two examples, what you understand by the term corrosion. Give electrochemical theory of corrosion. (4.5)

- Q.9 (a) Describe various methods of preventing corrosion. (4)
- (b) Explain the difference between (i) ideal and non-ideal solution, and (ii) weak and strong electrolyte. (2, 2)
- (c) When benzoic acid was shaken with mixtures of benzene and water at constant temperature, following results were obtained.
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|------|----------------------------|------|------|------|
| (i) | conc. in benzene (C_1) | 0.30 | 0.55 | 0.90 |
| (ii) | conc. in water (C_2) | 0.15 | 0.22 | 0.03 |
- Comment on the results. (4.5)