
UNIVERSITI SAINS MALAYSIA

Second Semester Examination
Academic Session 2001/2002

February/March 2002

KEN 300 – Environmental Chemistry

[Time : 3 hours]

Answer any **FIVE** questions.

All questions are of equal value (20 marks for each question).

This paper contains **SIX** questions (2 pages).

1. Photochemical smog is characterized by the formation of oxidants, in particular the undesirable oxidant ozone. However global efforts are in place to ban the production, storage and use of ozone depleting substances. Explain the apparent contradiction of the global efforts aimed at ozone preservation.
(20 marks)
2. Describe the sources, effects and control of particulate and gaseous emissions in the anthrosphere.
(20 marks)
3. Outline a particular classification scheme for hazardous substances and wastes. Describe the fate of hazardous wastes in the anthrosphere.
(20 marks)
4. (a) What are the two reasons that soap is environmentally less harmful than ABS surfactant used in detergents?
(5 marks)
- (b) A polluted water sample is suspected of being contaminated with one of the following: soap, ABS surfactant, or LAS surfactant. The sample has a very low BOD relative to its TOC. Which is the contaminant?
(3 marks)

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- (c) Of the compounds $\text{CH}_3(\text{CH}_2)_{10}\text{CO}_2\text{H}$, $(\text{CH}_3)_3\text{C}(\text{CH}_2)_2\text{CO}_2\text{H}$, $\text{CH}_3(\text{CH}_2)_{10}\text{CH}_3$, and $\text{C}_6\text{H}_5(\text{CH}_2)_{10}\text{CH}_3$, which is the most readily biodegradable? Why?
- (12 marks)
5. (a) Discuss some of the advantages of physical-chemical treatment of wastewater as opposed to biological treatment of wastewater. What are some disadvantages?
- (10 marks)
- (b) In treating water for industrial use, consideration is often given to "sequential use of the water". What is meant by this term? Give some plausible examples of sequential use of water.
- (10 marks)
6. (a) In what respects may it be said that measures taken to alleviate water pollution tend to generate other forms of hazardous wastes?
- (10 marks)
- (b) Explain why a certain part of the hydrosphere is most subjected to long term, largely irreversible contamination from the improper disposal of hazardous waste in the environment?
- (7 marks)
- (c) A sample was taken from the bottom of a stagnant river in Penang. Upon standing, bubbles were evolved from the sample; the pH went up; and a white precipitate formed. From these observations, what may be said about the dissolved CO_2 and hardness in the water?
- (3 marks)