

BINDURA UNIVERSITY OF SCIENCE EDUCATION

DEPARTMENT OF CHEMISTRY

CH424: ENVIRONMENTAL CHEMISTRY

AUG 2024

TIME: 2 HOURS

ANSWER QUESTION 1 AND FOUR OTHERS. TWO FROM EACH OF SECTIONS A AND B. EACH QUESTION CARRIES 20 MARKS.

1. (a) Define the term leachate. [1 marks]
- (b) Describe the sources of nitrous oxide. [8 marks]
- (c) What are photochemical reactions? [2 marks]
- (d) State general properties organochlorine pesticides. [3 marks]
- (e) Using chemical equation explain how phosphorous may be removed. [6 marks]

SECTION A: ANSWER ANY TWO QUESTIONS FROM THIS SECTION

- 2 (a) With the aid of balanced reactions describe the oxygen cycle. [15 marks]
- (b) Discuss the sources of nitric oxide. [5 marks]
- 3 (a) Describe the reactions for OH radical removal by sinks. [14 marks]
- (b) Discuss effects of atmospheric sulphur dioxide. [7 marks]
4. (a) Discuss with examples two geoengineering schemes that have been proposed to slow or halt global warming in recent years. [12 marks]

- (b) Discuss the incentives behind the production and use of biofuels rather than fossil fuels. [8 marks]

**SECTION B: ANSWER ANY TWO QUESTIONS FROM THIS SECTION**

5. (a) (i) Explain the chemistry underlying the disinfection of water by chlorination. [6 marks]
- (ii) Discuss the advantages and disadvantages of using chlorination to disinfect water, including the nature of the THM compounds. [6 marks]
- (b) (i) What two other chemical methods, other than chlorination, are used to disinfect water? [2 marks]
- (ii) What are some advantages and disadvantages to these alternatives? [6 marks]
6. (a) (i) Define the term speciation in chemistry. [2 marks]
- (ii) Using mercury as an example, explain the significance of speciation in environmental problems. [6 marks]
- (b) What are the main health concerns about arsenic in drinking water? [6 marks]
- (c) How does the phenomenon of acid rain indirectly affect the risk to human health from mercury, lead, and cadmium? [6 marks]
7. (a) (i) Name any four pesticides on the United Nations persistent organic pollutants (POP) list. [4 marks]
- (ii) Explain why DDT is no longer used in many developed countries? [2 marks]
- (b) In what way are organophosphate insecticides considered superior to organochlorines as pesticides? [2 marks]

- (c) Other than the chlorophenols and PCBs, what are some of the four sources of dioxins and furans in the environment? [4 marks]
- (d) Name the four postulated effects of environmental hormones on human health. [4 marks]
- (e) What are the four ways are used to recycle plastics? [4 marks]

END