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University Examinations 2024/2025

FOURTH YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE CHEMISTRY AND BACHELOR OF SCIENCE (CHEMISTRY)

SCH 3408: ENVIRONMENTAL CHEMISTRY

DATE: JANUARY 2025

TIME: 2 HOURS

INSTRUCTIONS: Answer question *one* and any other *two* questions

QUESTION ONE (30 MARKS)

a) Name:

- (i) Part of the Earth upon which humans live and from which they extract most of their food, minerals, and fuels. (1 mark)
- (ii) Atmospheric layer extending from about 50 to 80 km. (1 mark)
- (iii) Environment made or modified by humans and used for their activities. (1 mark)
- (iv) Molecules that absorb UV light from the sun. (1 mark)
- (v) Atmospheric layer nearest the Earth's surface. (1 mark)
- (vi) Field that deals with the characteristics of fresh water. (1 mark)

(b) Explain why:

- (i) Air temperature drops uniformly with altitude in the troposphere. (1 mark)
- (ii) Little water is transferred from the troposphere to the stratosphere. (1 mark)

(iii) Smaller particles are more harmful in the environment than large particles. (2 marks)

(c) (i) Identify the six criteria air pollutants. (3 marks)

(ii) What do the following short terms stand for? (3 marks)

PAHs.

VOCS

BOD

(d) Describe the different parts of hydrologic cycle. (5 marks)

(e) Show chemical reactions for the degradation of ozone layer by chlorofluorocarbon (CF₂Cl₂) molecule.

(f) Describe the following terms. (3 marks)

(i) Photochemical smog (2 marks)

(ii) Vitrification (2 marks)

(iii) Biodegradation (2 marks)

QUESTION TWO (20 MARKS)

a) List the order of effectiveness of hazardous waste management options from the most desirable to the least desirable. (6 marks)

(b) Explain the following chemical methods of waste treatment.

(i) Chemical extraction or leaching (3 marks)

(ii) Ion Exchange (3 marks)

(iii) Photolytic reactions (3 marks)

(c) Match the process or industry from the column on the left with its "phase of waste treatment" from the list on the right, below. (5 marks)

Process	Phase of waste treatment
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i. Activated carbon sorption ii. Precipitation iii. Reverse osmosis iv. Emulsion breaking v. Slurrying	Primary treatment Secondary treatment Polishing
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QUESTION THREE (20 MARKS)

- a) Describe possible ways of controlling air pollution from combustion of fossil fuels. (14 marks)
- b) Describe the following ways of waste disposal.
- (i) Disposal aboveground (3 marks)
- (ii) Landfill (3 marks)

QUESTION FOUR (20 MARKS)

Explain the following processes and their environmental effects.

- (a) Global warming (5 marks)
- (b) Eutrophication (5 marks)
- (c) Temperature inversion (5 marks)
- (d) Acid rain (5 marks)