

THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

SECOND SEMESTER EXAMINATION

CH 362 – ENVIRONMENTAL CHEMISTRY I

FRIDAY 23<sup>rd</sup> OCTOBER 2020 – 12:50 PM

**TIME ALLOWED: 2 HOURS**

**INFORMATION FOR CANDIDATES: -**

1. You will have 10 minutes to read the question paper. You **MUST NOT** begin writing in the answer book during this time.
2. **ANSWER ALL QUESTIONS.**
3. All answers **MUST** be written on the answer book provided
4. Calculators are permitted in the examination room. Lecture notes, notebooks plain papers and textbooks are **NOT** allowed.
5. Mobile phones are not allowed. **SWITCH OFF THE MOBILE PHONES.**
6. Show all workings and calculations in the answer book.
7. **DRAW the STRUCTURES** clear and visible.
8. **DO NOT** over write.
9. Write your name and student ID number clearly on the front page of the answer book. **DO IT NOW.**

**MARKING SCHEME:**

**TOTAL 60 MARKS**

1. (a) Define environmental chemistry and differentiate it from environmental science. [3 marks]
- (b) Name FIVE examples of anthropogenic activities that have significantly altered the environment and its chemistry. [2.5 marks]
- (c) Differentiate between the TWO main groups of atmospheric pollutants. [4 marks]
- (d) Name the anthropogenic activities that emit methane ( $\text{CH}_4$ ) gas into the atmosphere. [2.5 marks]
- (Total = 12 marks)
2. (a) Give a definition of water pollution. [3 marks]
- (b) Name the THREE forms in which chlorine is available for treating water for household use. [3 marks]
- (c) How do detergents contribute to water pollution? [2 marks]
- (d) Briefly discuss the adverse effects of eutrophication. [3 marks]
- (Total = 11 marks)
3. (a) Define acid rain and name TWO main precursor gasses that contribute to this phenomenon. [4 marks]
- (b) Discuss the terms “bioaccumulation and biomagnification”. [3 marks]
- (c) Describe how a metal exerts its toxicity and name any TWO mechanisms and sites of action for its toxicity in humans. [3 marks]
- (d) Define the acronym “POPs” and give THREE important characteristics of these group of chemicals. [4 marks]
- (Total = 14 marks)
4. (a) Define biogeochemical cycles. [3 marks]
- (b) Differentiate between endogenic and exogenic chemical cycles. [3 marks]
- (c) Briefly discuss the nitrogen cycle. [4 marks]
- (Total = 10 marks)

5. (a) What is 'hyphenated analytical technique' and why has it gained rapid development in recent years? [3 marks]
- (b) Name THREE atomic spectrometric methods for metals analysis and state their respective atomisation methods. [6 marks]
- (c) Briefly discuss the basic principle of chromatographic methods used for organic contaminant analysis. [4 marks]

(Total = 13 marks)