

UNIVERSITY OF FORT HARE

PAC 326

MAIN EXAMINATION

NOVEMBER 2018

Time: 3 HOURS

Subject: Environmental Chemistry 2

Marks: 100

This paper consists of 5 pages including cover page

Internal Examiner

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Instructions: There are 5 questions in this examination.

Answer ALL

Question 1

- a) What is biochemical oxygen demand (BOD) ? [1]
- b) Five millilitres (5ml) of a waste water sample was added to dilute water in a 300ml BOD bottle. If the following results were obtained, what is the BOD after 3 days and 5 days? [10]

TIME (DAYS)	DISSOLVED OXYGEN (mg/l)
0	9.55
1	4.57
2	4.00
3	3.20
4	2.60
5	2.40
6	2.10

- c) In an ecosystem, virtually nothing is wasted discuss. Support your discussion with a simplified aquatic ecosystem from a river-bed community. [9]

[20 marks]

Question 2

- a) What is pollution? [2]
- b) Briefly describe the various types of pollution. [6]
- c) What is point source and non-point source pollution? [2]

Based on your answer to question 2c above, classify the following as point sources or nonpoint sources pollution. [5]

- i) Sewage from a boat
 - ii) Urban runoff from storm sewers
 - iii) Thermal (hot) water from a power plant
 - iv) Steam from a coal- fired station
 - v) Fertilizer runoff from farmland
- e) What is the best way to reduce the use of oil (petroleum product) to slow down the rate of global warming and improve air quality? [5]

[20 marks]

Question 3

- a) What is green chemistry? [2]
 - i) Highlight the 4 concepts that covers the 12 principles of green chemistry?[2]

- ii) What is the relationship between green chemistry and environmental chemistry? [2]
 - b) One of green chemistry principles is that it is use fewer chemical process steps in making new product (chemical). How if at all does this principle relates to energy efficiency? [2]
 - c) Recycling is a basic application towards the concept of green chemistry.
 - i) What is recycling? [2]
 - ii) What are the two components of recycling in modern waste reduction [2]
 - iii) List four recyclable materials [2]
 - iv) How would you recycle the following material: paper, glass and tyre [6]
- [20 Marks]**

Question 4

- a) (i) Briefly describe the term municipal waste and give at least four examples [3]
 - ii) Why is it advisable to return used battery to the seller and not just dump in the bin [2]
 - b) With chemical equations where necessary, explain what each of the following disinfection methods in terms of clean environment and safety. Are there any advantages or disadvantages of each of these methods to the environment? [9]
 - i) Chlorine disinfection
 - ii) Ozone disinfection
 - iii) Ultraviolet disinfection
 - c) Briefly write short notes on the following methods/techniques of treating polluted air [6]
 - i) Electrostatic precipitator
 - ii) Catalytic converter
 - iv) Scrubber systems
- [20marks]**

Question 5

- a) i) What is renewable and non-renewable energy? [4]
- ii) Give 3 examples of each of the above [3]
- iii) What are the main energy sources for human activities [3]
- iv) What are the adverse effects of these main energy sources on the environment? [4]
- b) Write short note of the following
 - i) Solar energy [2]

- ii) Biodiesel production [2]
- iii) Syngas and its production [2]

[20marks]