UNIVERSITY OF RUHUNA

SECOND EXAMINATION OF BSc IN GREEN TECHNOLOGY (PART I)

JULY 2022

INTRODUCTORY GREEN CHEMISTRY (ID2101)

INDEX NO: .....

STRUCTURED AND ESSAY TYPE (TIME: 2 Hours)
Answer all questions in PART A
Answer to the structured questions in PART A must be done in the spaces provided.
Answer only Three questions from PART B
Answers to Essay type questions in PART B must be done on the answer books
All questions carry equal marks
Only non-programmable calculators are permitted.
Mobile phones are NOT permitted.

PART A: STRUCTURED TYPE (ANSWER BOTH (2) QUESTIONS)

01. (i). What is meant by Environmental Biochemistry? Give 2 examples.

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(40 marks)

(ii) What is meant by command-and-control approach? What is the importance of it?

(40 marks)

(iii) List down 5 characteristics of compounds that meet the criteria of being green.

(20 marks)

02. (i) What is meant by atom economy?

(40 marks)

(ii) Atom economy can be enhanced by reducing intermediate derivatives. Draw a suitable diagram to explain.

(60 marks)

PART B: ESSAY (Answer All Questions)

01.

(i) "Green chemistry is sustainable in many ways". Justify the statement.

(ii) How does green chemistry aim to reduce risk in the laboratory? Explain.

(iii) Discuss how the atom economy is more beneficial rather than yield with respect to green chemistry?

(iv) Briefly describe the 3rd principal of green chemistry?

(v) How does the first principal affect to enhance the quality of the environment? Explain.

(20×5Marks)

02.

(i) Chlorofluorocarbons are considered as non-green compounds. Discuss.

(ii) What is the green route of nitrogen generation? Explain.

(iii) Why is electrolysis of water called as a green process? Explain using relevant equations.

(iv) What is meant by ionic liquids? Explain using an example.

(v) What are the applications of ionic liquids in green Chemistry?

(20×5 Marks)

03.

(i) What is the percentage composition of calcium oxalate, $Ca(HCO_3)_2$ if the relative atomic masses given as Ca 40.0, C 12.0, H 1g and O 16.0?

(20 Marks)

(ii) Consider the following two reactions of synthesizing HNO_3.

$$NaNO_3 + H_2SO_4 \longrightarrow 2HNO_3 + Na_2SO_4$$

$$3NO_2 + H_2O \longrightarrow 2HNO_3 + NO$$

Which method is feasible in terms of atom economy?

(80 Marks)

04.

(i) What are the properties of $ScCO_2$? Explain 5 of them.

(ii) What are the commercial applications of $ScCO_2$? List 3 of them.

(iii) List down 3 limitations of using $ScCO_2$.

(iv) What is meant by a limiting reagent?

(v) 120g of elemental Zn and 60g of elemental S are mixed & heated to produce ZnS. What mass of ZnS is produced? What is the limiting reagent? Relative atomic masses of Zn = 65.4, S=32.0.

(20×5 Marks)

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