

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?

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(40 marks)

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

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(20 marks)

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

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(40 marks)

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

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(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 principle of green chemistry?
- (v) How does the first principle 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?

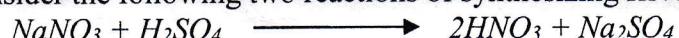
(20×5 Marks)

03.

- (i) What is the percentage composition of calcium oxalate, Ca (HCO₃)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 HNO₃.



Which method is feasible in terms of atom economy?

(80 Marks)

04.

- (i) What are the properties of ScCO₂? Explain 5 of them.
- (ii) What are the commercial applications of ScCO₂? List 3 of them.
- (iii) List down 3 limitations of using ScCO₂.
- (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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