

This question paper contains 4 printed pages].

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S. No. of Question Paper : 5694

Unique Paper Code : 2173012008

Name of the Paper : DSE : Green Chemistry in Organic Synthesis

Name of the Course : B.Sc. (Hons.) Chemistry

Semester : IV

Duration : 3 Hours

Maximum Marks : 90

(Write your Roll No. on the top immediately on receipt of this question paper.)

All questions carry equal marks.

There are eight questions in all.

Attempt any six questions.

Calculator is allowed.

Each question carries 15 marks.

1. (i) Fill in the blanks with appropriate terms :

(a) The concept of E-factor, aims to be as as possible in green synthesis.

(b) Designing synthetic methods to maximize the incorporation of all materials used in the process into the final product is known as

P.T.O.

- (c) The number of moles of product produced per mole of catalyst per second is known as
- (d) Photoreduction of CO_2 to CH_4 majorly deals with the principle of green chemistry.
- (ii) Explain 'design for degradation' with *two* suitable examples in the context of green chemistry ?
- (iii) Discuss the statement, $\text{Risk} = f [(\text{Hazard}) \times (\text{Exposure})]$. Also, explain the terms involved.
- (iv) Explain the Kyoto Protocol, an international treaty extending the 1992 United Nations Framework Convention on Climate Change (UNFCCC). 4,4,4,3
2. (i) What is nanozyme and how does it help in green chemistry organic synthesis ? Explain with a suitable example.
- (ii) State any *three* of the twelve principles of green chemistry.
- (iii) Define the following with example :
- (a) Benign byproduct
- (b) Nanocatalyst
- (c) Turnover frequency
- (d) ISD. 5,5,5
3. (i) What are the benefits of using microwave irradiation in organic synthesis from a green chemistry perspective ? Explain with an example.

- (ii) What is a supercritical fluid ? Give an example of its application as a green solvent or reaction medium.
- (iii) How healthier fats and oils can be synthesized by interesterification method ? Discuss.
- (iv) Classify organic solvents on the basis of their toxicity. Give examples of Green solvents. 4,4,4,3
4. (i) Explain the synthesis of Vitamin-C using Hoffman La Roche method.
- (ii) Differentiate Homogeneous and Heterogeneous catalysts.
- (iii) What is waste or pollution prevention hierarchy ? Explain with diagram.
- (iv) What are ionic liquids ? Why are they considered as 'designer solvents' ? 4,4,4,3
5. (i) What do you understand by the term "what you don't have can't harm you" ? Explain with suitable example.
- (ii) Briefly explain the concept of "inherently safer chemistry for accident prevention" with suitable example.
- (iii) What are auxiliary substances ? Discuss the problems associated with Volatile organic solvents.
- (iv) Give *one* example of electrocatalysis. 4,4,4,3

6. (i) What do you understand by atom economy and percentage yield ?
Explain with example.
- (ii) What is protecting group in the organic synthesis ? How protection and deprotection by protecting group help in the atom economy in the organic synthesis.
- (iii) Why green chemistry is also known as environmentally benign chemistry ? 5,5,5
7. (i) Explain how cradle to cradle recycling concept is applied to carpets ?
- (ii) Green chemistry and sustainable development are inter-related.
Explain.
- (iii) Discuss the advantages of combinatorial approach over conventional synthesis. 5,5,5
8. Write short notes on :
- (i) Environmental impact factor
- (ii) Biomimicry and green chemistry
- (iii) Flixiborough disaster. 5,5,5