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3 (Sem-6/CBCS) CHE-HE 1

2025

CHEMISTRY

(Honours Elective)

Paper : CHE-HE-6016

(Green Chemistry)

Full Marks : 60

Time : Three hours

***The figures in the margin indicate
full marks for the questions.***

1. Answer the following questions as directed :

1×7=7

(a) An act was setup in 1990 to reduce or eliminate the toxicity of wastes. Name the act.

(b) Risk = Function (Hazard × _____).
(Fill in the blank)

(c) Which greenhouse gas can be used as an excellent green solvent ?

(d) Define atom economy.

- (e) What are co-crystals ?
- (f) Itai-itai disease is caused due to _____ poisoning. (Fill in the blank)
- (g) What does EPA stand for ?

2. Answer the following questions : $2 \times 4 = 8$

- (a) What are green solvents ? Explain with examples.
- (b) Mention *two* uses of supercritical carbon dioxide.
- (c) Give example of an ionic liquid. Why ionic liquid is termed as 'designer solvent' ?
- (d) What are organic pigments ?

3. Answer **any three** questions : $5 \times 3 = 15$

- (a) Ultrasound assisted reaction is a step towards a greener environment. Justify giving example.
- (b) Plastic waste imposes a great problem in today's world. Discuss the approach of an environmentalist and a green chemist in combating this problem.
- (c) What are goals of Green Chemistry ? Mention the obstacles in the pursuit of the goals of green chemistry. $3 + 2 = 5$

- (d) What are feedstocks for green synthesis of ibuprofen ? Write the name and chemical structure of it. Write the chemical reaction involved in green synthesis of it. $1 + 1 + 1 + 2 = 5$

- (e) How phenolic ketones can be prepared by microwave-assisted Fries rearrangement ? What happens when esters are microwave irradiated using KOH-Aliquat ? Write chemical reactions. $2\frac{1}{2} + 2\frac{1}{2} = 5$

4. Answer **any three** from the following questions : $10 \times 3 = 30$

- (a) (i) Discuss *two* advantages of microwave assisted organic synthesis. Write the reaction of Diels-Alder reaction under microwave irradiation. 5
- (ii) Discuss the role of Tellurium in the debromination of *vic*-dibromides. What is clayan ? $4 + 1 = 5$
- (b) (i) Give green synthesis of following : $2\frac{1}{2} \times 2 = 5$
- (I) Furfural
- (II) Urethane

- (ii) Explain with reactions of microwave-assisted reactions in water :
Oxidation of toluene and alcohols.
 $2\frac{1}{2} \times 2 = 5$
- (c) (i) What are the *twelve* principles of Green Chemistry ? 4
- (ii) Explain *four* principles with suitable examples. $1\frac{1}{2} \times 4 = 6$
- (d) (i) Explain biomimetic synthesis with an example. How it is differ from biocatalysis ? $3 + 2 = 5$
- (ii) Write a comparative statement on Green Chemistry and Synthetic Chemistry. 5
- (e) (i) What are the roles of Green Chemistry in sustainability ? 5
- (ii) Discuss the use of antifoulant in the field of environmentally safe water transportation. 5
- (f) (i) Compare the traditional and green synthesis rout of paracetamol. 5
- (ii) What are the future prospects of Green Chemistry ? Write briefly on combinational Green Chemistry.
 $2 + 3 = 5$