

(7 pages)

Reg. No. :

Code No. : 6398

Sub. Code : ZCHE 11

M.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2022.

First Semester

Chemistry

Elective – GREEN CHEMISTRY TECHNIQUES AND
APPLICATIONS

(For those who joined in July 2021 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1. Green chemistry is also called as

- (a) Life chemistry
- (b) Environmental chemistry
- (c) Organic chemistry
- (d) Sustainable chemistry

2. 'E' Factor is

- (a) Mass ratio of waste to desired product
- (b) Ratio of molecular weight of desired product and molecular weights of all substances produced in the stoichiometric equation
- (c) Percentage of all the materials used in the preparation
- (d) Total mass used in a process divided by the mass of product

3. "Zeolite" is the broad term used to describe a family of minerals called

- (a) Tri silicates (b) Tectosilicates
- (c) Tetrasilicates (d) Pentasilicates

4. Greener catalysis means

- (a) Moving away from stoichiometric processes to homogenous and heterogeneous catalytic reactions using organic, organometallic, inorganic and biological catalysts
- (b) Developing chemicals that are recyclable
- (c) Design chemical products and processes that work most efficiently
- (d) Reduced costs associated with waste treatment and disposal

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5. An ideal solvent facilitates the _____
(a) Mass transfer (b) Dissolving property
(c) Combustion (d) Titration
6. Which of the following is the greenest solvent?
(a) Formaldehyde (b) Benzene
(c) Ethanol (d) Water
7. Microwave assisted reaction operates at a frequency of _____.
(a) 3 GHz (b) 2.45 GHz
(c) 2 MHz (d) 3 MHz
8. In microwave Assisted Hofmann Elimination quaternary ammonium salts are heated at
(a) High temperature and the yield of the Hofmann elimination product is low
(b) Low temperature and the yield of the Hofmann elimination product is high
(c) High temperature and the yield of the Hofmann elimination product is high
(d) Low temperature and the yield of the Hofmann elimination product is low

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9. A Solar cell is an electrical device that converts the energy of light directly into electricity by the
(a) Photovoltaic effect
(b) Chemical effect
(c) Atmospheric effect
(d) Physical effect
10. The main composition of biogas is _____.
(a) Nitrogen (b) Carbon dioxide
(c) Methane (d) Hydrogen

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) (i) Explain atom economy.
(ii) Write a brief notes on waste minimisation.
- Or
- (b) (i) What is reaction mass efficiency?
(ii) Define Mass intensity.

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[P.T.O.]



12. (a) (i) Which catalyst is used in green chemistry?
(ii) What are the three types of catalyst? Give example for each type.

Or

- (b) Write notes on alternate energy sources to conventional energy sources.
13. (a) (i) What is super cooled water?
(ii) Write and explain a green reaction done with super cooled water.

Or

- (b) Write notes on tunable and switchable solvent systems
14. (a) Write Photochemical ring closure of dienes and explain mechanism.

Or

- (b) Explain the merits and demerits of microwave techniques.
15. (a) What are the top five sources of renewable energy?

Or

- (b) Discuss the applications and limitations of geothermal Power.

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PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) State the Principles of Green Chemistry.

Or

- (b) Discuss the steps for reduction of non-renewable raw materials usage.

17. (a) Discuss Bio-catalysis.

Or

- (b) Write notes on Phase-transfer catalysis and its advantage.

18. (a) Discuss any Four chemical reactions done with green solvents.

Or

- (b) Discuss the applications of ionic liquids as catalysts and solvents.

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19. (a) (i) Write notes on Microwave assisted Hoffman elimination and Heck reactions.
- (ii) Explain Microwave solvent free deacetylation and saponification of ester reactions.

Or

- (b) (i) What do you mean by sonochemistry?
- (ii) Discuss the Principle of sonochemistry.
- (iii) Write notes on ultra sound assisted Simmons-Smith reaction.
20. (a) Explain the Principle, types and applications of solar cells.

Or

- (b) Write note on
- (i) Hydroelectric Power
- (ii) Biomass
- (iii) Wind Power and
- (iv) Geothermal Power
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