

FOR REFERENCE ONLY

Total Pages : 8

**M2CHE04-CC08**

M. Sc. II Semester Examination, 2017

**CHEMISTRY**

Paper-IV

(Environmental and Green Chemistry)

Time : Three Hours

Maximum Marks : 80

**PART - A ( खण्ड-अ )** [Marks : 20

Answer all questions (50 words each).

All questions carry equal marks.

सभी प्रश्न अनिवार्य हैं। प्रत्येक प्रश्न का उत्तर पचास शब्दों से अधिक न हो।

सभी प्रश्नों के अंक समान हैं।

**PART - B ( खण्ड-ब )** [Marks : 40

Answer *five* questions (250 words each).

Selecting *one* from each unit. All questions carry equal marks.

प्रत्येक इकाई से एक-एक प्रश्न चुनते हुए, कुल पाँच प्रश्न कीजिए।

प्रत्येक प्रश्न का उत्तर 250 शब्दों से अधिक न हो।

सभी प्रश्नों के अंक समान हैं।

**PART - C ( खण्ड-स )** [Marks : 20

Answer any *two* questions (300 words each).

All questions carry equal marks.

कोई दो प्रश्न कीजिए। प्रत्येक प्रश्न का उत्तर 300 शब्दों से अधिक न हो।

सभी प्रश्नों के अंक समान हैं।

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## PART - A

### UNIT - I

#### 1. Answer all questions :

- (i) What is atom economy of Diel's Alder reaction ?
- (ii) Give the two problem which is caused by waste.

### UNIT - II

- (iii) Give two examples of supercritical fluid as green solvent.
- (iv) Give two examples of green reagents including replacement of phosgene.

### UNIT - III

- (v) What is the structure of citral and give one use of it ?
- (vi) What is the atom economy in Boot's synthesis of ibuprofen and green synthesis of ibuprofen ?

### UNIT - IV

- (vii) What do you mean by Carcinogens ?
- (viii) Write the name of green house gases.

### UNIT - V

(ix) Define COD.

(x) What is smog ?

2×10

PART - B

UNIT - I

2. What are waste ? Discuss solid waste utilization techniques.

2+6

3. Define atom economic and uneconomic reaction giving suitable examples.

4+4

UNIT - II

4. Explain :

(a) Solid state polymerisation

(b) Solvent free reaction

4+4

5. Give an account on supercritical fluids ( $H_2O$  &  $CO_2$ ). 4+4

### UNIT - III

6. Give the green synthesis of following compounds :

(a) Citral

(b) Ibuprofen

4+4

7. Give the principles and applications of microwave assisted

synthesis.

8

### UNIT - IV

8. Explain the chemical and photochemical reaction in the

atmosphere.

4+4

9. Give the toxicological effect of following :

(a) Lead

(b) Oxides of nitrogen

4+4

### UNIT - V

10. How do you determine conductivity and acidity in the given water sample ?

4+4

11. Give the determination of following in water sample :

(a) Sulphate

(b) Total dissolved solid

(c) Chloride

3+3+2

## PART - C

2. Describe the twelve principles of green chemistry. 10

### UNIT - II

13. Write short note on the following :

- (a) Reducing toxicity
- (b) Alternative nitrile synthesis
- (c) Polymer supported reagent 4+3+3

### UNIT - III

14. Give the green synthesis of following compounds :

- (a) Polycarbonates

(b) Paracetamol

(c) Adipic acid

4+3+3

#### UNIT - IV

15. Write short note on :

(a) Sewage treatment

(b) Lithosphere and chemistry involved

5+5

#### UNIT - V

16. Write short note on :

(a) Sampling and monitoring of air & water

(b) Surfactant causing pollution

(c) Hardness

4+3+3



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Part-B (खण्ड-ब)

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Answer five questions (250 words each), selecting one question each Unit. All questions carry equal marks.

प्रत्येक इकाई में से एक-एक प्रश्न चुनते हुए, कुल पाँच प्रश्न कीजिए। प्रत्येक प्रश्न का उत्तर 250 शब्दों से अधिक न हो।

सभी प्रश्नों के अंक समान हैं।

Part-C (खण्ड-स)

[Marks : 20

Answer any two questions (300 words each)

All questions carry equal marks.

कोई दो प्रश्न कीजिए। प्रत्येक प्रश्न का उत्तर 300 शब्दों से अधिक न हो। सभी प्रश्नों के अंक समान हैं।

## Part-A

1. Answer all questions—

- (i) What is atom economy ? Calculate the percentage atom economy of claisen rearrangement.
- (ii) What do you mean by green chemistry and who discovered the concept of green chemistry ?
- (iii) What are polymer supported reagents ? Explain giving one example.
- (iv) What do you mean by green solvent ?
- (v) How green synthesis is better than conventional synthesis ? Explain giving an example.

- (vi) What is the basic principle of microwave assisted synthesis ?
- (vii) What is green house effect ? How does it affect atmospheric quality.
- (viii) What is Anthrosphere ? What are its constituents?
- (ix) What is BOD ? Write its significance.
- (x) What are pesticides. Name any two pesticides. 2×10

**Part-B**

**Unit-I**

2. Write a short note on-

(a) Phase transfer catalysis

(b) Reducing toxicity. 4+4

3. Write principles of green chemistry. 8

## Unit-II

4. Write a short note on-
- (a) Polymer supported reagents
  - (b) Fluorous biphase solvent.
- 4+4
5. What do you mean by solvent free reactions. Discuss with suitable examples.
- 8

## Unit-III

6. Give the green synthesis of following compounds-
- (a) Ibuprofen
  - (b) Polycarbonate
- 4+4
7. Write the classification and applications of microwave assisted synthesis.
- 8

## Unit-IV

8. Give the toxicological effect of following-
- (a) Mercury
  - (b) Cadmium
- 4+4

9. Write a short note on—

(a) Physical chemistry of sea water

(b) Lithosphere and its chemistry. 4+4

#### Unit-V

10. What is hardness ? How do you determine temporary and permanent hardness of water ? 8

11. Discuss the catalysts of aquatic chemical reactions water pollution laws and standards.

#### Part-C

#### Unit-I

12. Define atom economic and uneconomic reactions giving suitable examples. 5+5

#### Unit-II

13. Write short note on the following—

(a) Methods of designing safer chemicals

(b) Supercritical-CO<sub>2</sub> 5+5

### Unit-III

14. Give the detail green synthesis of Adipic acid and citral. 5+5

### Unit-IV

15. Write a short note on the following—

(a) Eutrophication

(b) Sewage treatment. 5+5

### Unit-V

16. Give the determination of following in water sample—

(a) Phosphate

(b) Fluoride

(c) Total dissolved solids. 3+3+4

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**PART-A**

[Marks : 20]

Answer all questions (50 words each).

All questions carry equal marks.

**PART-B**

[Marks : 40]

Answer *five* questions (250 words each), selecting *one* question from each unit. All questions carry equal marks.**PART-C**

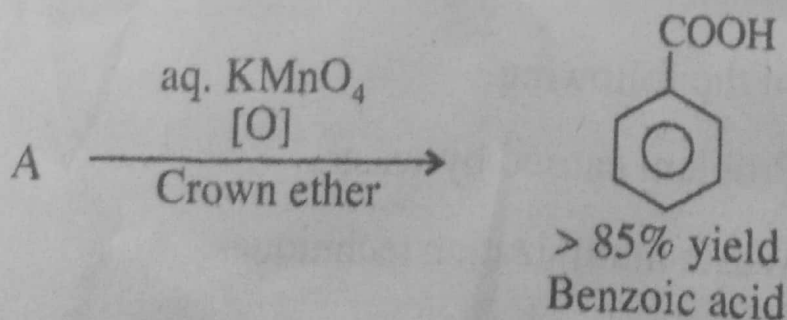
[Marks : 20]

Answer any *two* questions (300 words each).

All questions carry equal marks.

**PART-A****UNIT-I**

1. (i) Predict the starting reactant of following reaction :



- (ii) What do you mean by polymer recycling ?

### UNIT-II

- (iii) Give an application of dimethyl carbonate.  
(iv) Define toxic nature of a chemical.

### UNIT-III

- (v) What is the meaning of eco friendly synthesis ? Give an example.  
(vi) Write the molecular structure of Acetaminophen.

### UNIT-IV

- (vii) Define green house effect.  
(viii) What is the chemical composition of smoke ?

### UNIT-V

- (ix) Why worry about acid soils ?  
(x) Give *one* application of surfactant. (2×10=20)

## PART-B

### UNIT-I

2. What is the meaning of 100% atom economic reactions ?  
Give an example. (8)
3. Explain the following :
- (a) Problem caused by waste.  
(b) Waste minimization techniques. (4+4=8)



## UNIT-II

4. Discuss water as a supercritical fluid. (8)
5. What is the basic concept of polymer supported reagent ?  
Explain with suitable example. (8)

## UNIT-III

6. Write short notes on :
- (a) Design for energy efficiency.
- (b) Green synthesis of adipic acid. (4+4=8)
7. Discuss the concept of microwave applied organic synthesis  
by giving a suitable example. (8)

## UNIT-IV

8. Explain physical chemistry of sea water. (8)
9. Explain process of eutrophication in detail. (8)

## UNIT-V

10. Define hard and soft water. Explain method of determination  
of hardness of water. (8)
11. Explain the relation between dissolved oxygen and day  
cycle. (8)

## PART-C

### UNIT-I

12. Discuss phase transfer catalysis (PTC) in detail through an example. (10)

### UNIT-II

13. Write as explanatory notes on :
- (a) Fluorous biphasic solvents.
  - (b) Alternative nitrile synthesis. (5+5=10)

### UNIT-III

14. Discuss the green synthesis of citral and styrene in detail. (10)

### UNIT-IV

15. Write an explanatory notes on :
- (a) Toxicological effects of lead.
  - (b) Possible carcinogens. (5+5=10)

### UNIT-V

16. Write short notes on the following :
- (a) Pesticides.
  - (b) Catalysts of aquatic chemical reactions. (5+5=10)