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5 SEM TDC DSE CHM (CBCS) 2 (H)

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(November)

CHEMISTRY

(Discipline Specific Elective)

(For Honours)

Paper : DSE-2

(Green Chemistry)

Full Marks : 53

Pass Marks : 21

Time : 3 hours

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

1. Choose the correct answer : 1×6=6

(a) Basically 'risk' is a function of

(i) pollution × prevention

(ii) pollution × hazard

(iii) hazard × exposure

(iv) pollution × exposure

(2)

(b) Photochemical smog of London was reported around

(i) 1-5 December, 1950

(ii) 1-5 December, 1952

(iii) 5-9 December, 1950

(iv) 5-9 December, 1952

(c) The book, *Silent Spring* was written by

(i) Rachel Carson

(ii) B. M. Trost

(iii) Lord Carson

(iv) John Warner

(d) Which of the following is not a green chemistry principle?

(i) Maximizing atom economy

(ii) Using catalysts

(iii) Producing derivatives

(iv) Use of renewable feedstock

(3)

(e) Which of the following is not an ionic liquid?

(i) [bmin][BF₄]

(ii) Ph₃PO

(iii) [emin][BF₄]

(iv) [bmim][PF₆]

(f) Which of the following reactions is most atom economical?

(i) Substitution reaction

(ii) Addition reaction

(iii) Elimination reaction

(iv) Rearrangement reaction

2. Answer the following questions (any *nine*):

2×9=18

(a) Explain the term 'atom economy' with a suitable example.

1+1=2

(b) What are green solvents? Name two green solvents.

1+1=2

(4)

- (c) What is the need of green chemistry?
- (d) How can you convert toluene into benzoic acid in green method?
- (e) Give one example of microwave-assisted reaction in organic solvents.
- (f) How do you prepare imidazole in solvent-free conditions using microwave?
- (g) What are the main differences between classical heating and microwave heating?
- (h) What do you mean by piezoelectric effect?
- (i) What is chemoselective reaction? Give one example of it. $1+1=2$
- (j) What are solid-state reactions? Give one example. $1+1=2$
- (k) How can you prepare adipic acid in green way?

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(Continued)

(5)

3. Answer the following questions (any six) : $3 \times 6 = 18$
- (a) Why is glycerol a green solvent? Explain with a suitable example. $1+2=3$
- (b) What are ionic liquids? How can Michael reaction be carried out with the help of ionic liquids? $1+2=3$
- (c) What is supercritical CO_2 ? How is it used as solvent in hydrogenation reaction? $1+2=3$
- (d) Write the alternative green procedure of pinacol-pinacolone rearrangement. Compare it with conventional procedure. $2+1=3$
- (e) What are sonication reactions? How can alcohol be prepared from Grignard reagent in green way? $1+2=3$
- (f) How can catechol be synthesized in green way? Compare the method with conventional method. $2+1=3$

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(Turn Over)

(6)

- (g) Explain three principles of green chemistry.
- (h) What are enzymes? Mention the advantages of using enzymes in relevance to green chemistry. $1+2=3$

4. Answer the following questions (any two) :

$$3\frac{1}{2} \times 2 = 7$$

- (a) How has disodium iminodiacetate (DSIDA) been synthesized traditionally by Strecker process? Write an alternative green procedure to prepare the DSIDA. $1\frac{1}{2} + 2 = 3\frac{1}{2}$
- (b) What are the important factors that have to be considered while designing a green alternative reagent for a synthesis?
- (c) Describe in brief why photochemical reactions are considered as green synthesis.

5. (a) Instead of anhydrous AlCl_3 , what green option will you suggest in Friedel-Crafts reaction? 2

Or

- (b) What are the advantages of green synthesis?

(7)

- (c) Write a note on combinatorial green chemistry. 2

Or

- (d) What are the characteristics of an ideal chemical reaction?
