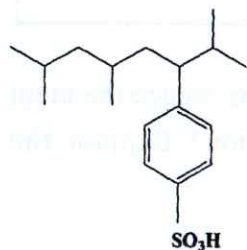


- (c) Which amongst the following two would be preferred as a detergent and why? Highlight the guiding principles on the basis of which the decision was made.



Branched chain alkyl sulphonate,
low degradation



Linear chain benzene sulphonate,
fast degradation

(4,4.5,4)

(1000)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5796

E

Unique Paper Code : 32177908

Name of the Paper : DSE Green Chemistry

Name of the Course : B.Sc. (Prog.)

Semester : VI

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **six** questions.
3. All parts of a question should be attempted together.
4. Each question carries **12.5** marks.
5. Take Atomic mass of C = 12, N = 14, O = 16, S = 32, H = 1.

P.T.O.

1. (a) Fill in the blanks (any six) :

- (i) An ideal chemical process would have an E-factor of _____ .
- (ii) _____ coined the term Green Chemistry in 1990.
- (iii) Addition reactions are atom _____ reactions.
- (iv) Light induced chemical reactions are also known as _____ reactions.
- (v) Sonochemistry involves the conversion of energy _____ into chemical energy.
- (vi) _____ book written by Rachel Carlson in 1962 launched a new public awareness on the harmful effects of using pesticides like DDT.
- (vii) Bhopal Gas Tragedy was caused due to the accidental release of _____ .
- (viii) The full form of the 3 R's is _____.

Industry	E-Factor
Oil refining	Chi
Bulk Chemicals	<1-5
Fine Chemicals	5-50
Pharmaceuticals	25-100

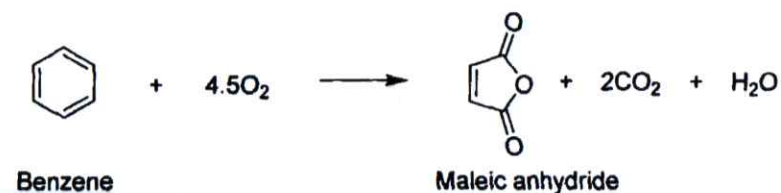
- (b) Why the use of protecting groups reduce the atom economy of a chemical reaction? Explain the principle involved.
 - (c) Outline the green alternative route for the synthesis of the following :
 - (i) Cyclohexanol
 - (ii) Pesticide Carbaryl (4.5,4,4)
8. (a) Discuss the environmental hazards of TBTO as an antifoulant, give structure of its green replacement and its benefit over TBTO.
- (b) Explain the principle of inherent safer design (ISD)? How does it work for designing the green processes in industries?

- (b) Discuss the application of enzymes in the industrial process by taking the example of adipic acid.
- (c) Plastic pollution has become a global menace. Why plastics are considered so dangerous? How has Green Chemistry provided solution for this problem? Discuss in context with the presidential Green Chemistry Challenge award won by Nature Works Company for PLA synthesis. (5,3.5,4)
6. (a) What makes microwave technology superior to conventional heating? Discuss microwave assisted Hofmann Elimination.
- (b) Which solvents fall under the banner of Green Chemistry? Shed light on the use of water as the solvent for carrying out organic reactions.
- (c) Write short notes on the following :
- (i) Fluorous Biphasic Solvents
- (ii) Ultrasound Assisted Synthesis (4.5,4,4)
7. (a) Giving suitable reason, explain which amongst the four industries is most waste generating. What measures can be taken to minimize waste?

- (b) State true or false :
- (i) Inorganic salts with melting points below 100°C are known as ionic liquids.
- (ii) Right fit azo pigment contains heavy metal ions.
- (iii) The use of solar energy is covered under green chemistry principle number 9.
- (c) What do you understand by the following terms? Explain briefly (**any two**) :
- (i) Real Time Analysis
- (ii) Mechano-chemical synthesis
- (iii) E-Factor (6,1.5,5)
2. (a) What do you understand by the term "atom economy"? Is it same as % yield? Justify your answer.
- (b) Calculate the atom economy for each of the routes involved in obtaining Maleic Anhydride.

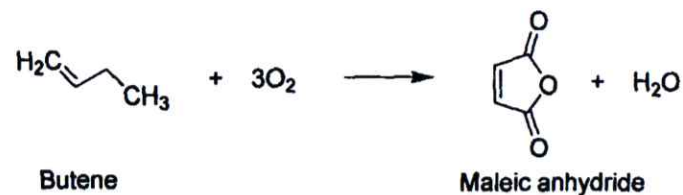
Route – 1

By benzene oxidation



Route – 2

By butene oxidation



- (c) Between the above two routes, which route would you prefer for preparation of Maleic Anhydride from an industrial perspective using fundamental understanding of Green Chemistry Principles and why? (4.5,4,4)

3. (a) What properties of a biocatalyst make it relevant in green chemistry? Give one industrial application of a biocatalyst.

(b) Write short notes on the following :

(i) Catalysis and Green Chemistry

(ii) Photocatalysis

- (c) Discuss the importance of asymmetric catalysts illustrating the thalidomide babies' case.

(4,4,4.5)

4. (a) Explain how the cradle-to-cradle approach is applied to carpets manufacturing?

- (b) Disodium iminodiacetate can be prepared using Strecker synthesis. What are the disadvantages associated with this method? Explain the alternative green methodology.

- (c) Why is the enzymatic inter-esterification process considered better than chemical inter-esterification? (4,4,5,4)

5. (a) Explain the following briefly and correlate with the principle of green chemistry involved:

(i) Surfactants for carbon dioxide

(ii) Use of a Rightfit pigment