



‘সমানো মন্ত্র: সমিতি: সমানী’

## UNIVERSITY OF NORTH BENGAL

B.Sc. Honours 4th Semester Examination, 2022

### SEC1-P2-CHEMISTRY

#### GREEN CHEMISTRY

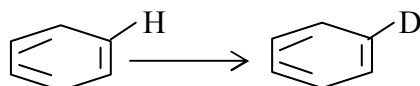
Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.  
All symbols are of usual significance.*

#### Answer any four questions from the following

1. (a) What do you mean by “Green Chemistry”? What are the main objectives of practising green chemistry (any three)? 2+3 = 5
- (b) Benzene is prepared by following two methods. 3
  - (i) Acetylene is passed through hot copper tube
  - (ii) Benzene sulphonic acid desulphurized. Which method is considered as green method?
- (c) Why we need to monitor an organic reaction after certain intervals of time? 2
2. (a) What is ionic liquid? How it differs from ionic solid (like NaCl, KCl)? 1+2 = 3
- (b) Write a brief note on the following: 2×2 = 4
  - (i) Room temperature ionic liquids (RTILs) and
  - (ii) Task-specific ionic liquids (TSILs).
- (c) Now a day, Thiazolium salts are frequently used in benzoin condensation reaction. What is reason behind the use of such Thiazolium salts? 3
3. (a) What do you mean by % of atom economy? Give two examples where the 100% of atom economy can be achieved? 1+2 = 3
- (b) In the following reaction mass of the product has been increased. 3



Do you expect the % atom economy may exceed over 100%?

- (c) Calculate the % atom economy for the following reactions: 2×2 = 4
  - (i)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2 - \text{OH} + \text{NaBr} + \text{H}_2\text{SO}_4 \rightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2 - \text{Br} + \text{NaHSO}_4 + \text{H}_2\text{O}$
  - (ii)  $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$

4. (a) Write two examples of green solvent. Supercritical CO<sub>2</sub> is considered as green solvent. Comment to justify this statement. 2+3 = 5
- (b) Find out the green solvent(s), solvent(s) can be used in laboratories and solvents should not be used in laboratories from the following list and comment for the selection: 5
- Benzene, dichloromethane, methanol, ethanol, chloroform, water, water-ethanol, ethyl acetate, petroleum benzene.
5. (a) Why catalytic reagents are superior to stoichiometric reagents? 2
- (b) What are major advantages and disadvantages of heterogeneous catalyst over homogeneous catalyst? 4
- (c) The blocking and deblocking of functional groups in organic synthesis is not accepted in the perspective of “Green Chemistry”. Comment on the fact. 3
- (d) What is e-factor in green chemistry? 1
6. Suggest Green synthesis of — 5+5 = 10
- (i) Ibuprofen and (ii) Poly lactic acid from corn.
- Mention the advantages over traditional process.
7. (a) How is Aspirin prepared by microwave method? 4+3+3 = 10
- (b) What are the advantages of microwave irradiation method over conventional method?
- (c) What are disadvantages of Microwave method?
8. (a) What environmental hazards are associated with CFCs, HCFs, VOCs and PERCs? 1  $\frac{1}{2}$  × 4 = 6
- (b) Biodiesel is rapidly depleting – How green chemistry came forward to solve this problem? 3
- (c) What is PTC? 1

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