

St. Montfort school Bhopal
Solution (5M)

1. A solution of glucose (molar mass = 180 g mol^{-1}) in water is labelled as 10 % (by mass). What would be the molarity and molality of the solution ? Given that the solution is 1.2 g mL^{-1}
2. Calculate the number of moles of methanol in 5 litres of its 2 m solution if the density of solution is 0.981 kg L^{-1} . (Molar mass of methanol = 32.0 g mol^{-1})
3. The solubility of $\text{Ba(OH)}_2 \cdot 8\text{H}_2\text{O}$ in water at 298 K is 5.6 g per 100g of water . What is the molality of the hydroxide ions in a saturated solution of Barium Hydroxide at 298 K ? (Ba = 137 , O = 16)
4. Find the molarity and molality of 15% solution w/w of H_2SO_4 (density of $\text{H}_2\text{SO}_4 = 1.02 \text{ g cm}^{-3}$)
5. Give an example of solution containing a solid solute in a solid solvent .
6. Define mole fraction .
7. What type of intermolecular attractive interaction exists in the pair of methanol and acetone ?
8. Some liquids on mixing form 'azeotropes' . What are 'azeotropes' ?
9. What are isotonic solution ?
10. Define van't Hoff factor?
11. What is the van't Hoff factor for a compound which undergoes dimerisation in an organic solvent ?
12. CCl_4 and water are immiscible whereas ethanol and water are miscible in all proportions. Correlate this behaviour with molecular structure of these compounds.
13. State Henry's Law ? What is the significance ?
14. Derive an equation to express that relative lowering of vapour pressure for a solution is equal to the mole fraction of the solute in it when the solvent alone is volatile .
15. State Raoult's Law for the solution containing volatile components . What is the similarity between Raoult's law and Henry's law ?
16. Explain ideal and non ideal solution ?
17. Why is increase in temperature observed on mixing chloroform and acetone ?
18. Why does sodium chloride solution freeze at lower temperature than water ?

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Haloalkanes and Haloarenes

Q1 Give reason for the following:

- Haloalkanes easily dissolve in organic solvents.
 - Allyl chloride is hydrolysed more readily than n-propyl chloride
2. Arrange the following in increasing order of their boiling points
 - a. Bromomethane, chloromethane, dibromomethane.
 - b. 1-chloropropane, isopropyl chloride, 1-chlorobutane.
 3. What happens when
 - Ethyl chloride is treated with aq. KOH?
 - Methyl bromide is treated with sodium in the presence of dry ether?
 - Methyl chloride is treated with KCN
 4. What are enantiomers ? Draw the structure of the possible enantiomers of 3-methylpent-1-ene?
 5. Why tert.-Butyl chloride reacts with aqueous sodium hydroxide by SN_1 mechanism while n-butyl chloride reacts by SN_2 mechanism?
 - 6 Give reason for the following

- P-Dichlorobenzene has higher melting point and lower solubility than o and m-isomers?
- Benzyl chloride undergoes SN1 reaction faster than cyclohexyl methyl chloride

7. Write only the chemical reaction for the following

- N-butyl chloride is treated with alcoholic KOH.
- Bromobenzene is treated with Mg in the presence of dry ether.
- Chlorobenzene is subjected to hydrolysis.

8 Give the structural formula and IUPAC name of the following compounds

BHC and DDT

9 Which compound in each of the following pairs will react faster in SN₂ reaction with OH⁻ ion?

CH₃Br or CH₃I b) (CH₃)₃CCl or CH₃Cl

10. Arrange the compounds of each set in order of reactivity towards SN₂ displacement

- 2-Bromo-2-methylbutane, 1-bromopentane, 2-bromopentane
- 1-bromo-3-methylbutane, 2-bromo-2-methylbutane, 2-bromo-3-methylbutane
- 1-bromobutane, 1-bromo-2,2-dimethylpropane, 1-bromo-2-methylbutane, 1-bromo-3-methylbutane

11. Although chlorine is an electron withdrawing group, yet it is ortho-, para-directing in electrophilic aromatic substitution reactions. Why?

12. The treatment of alkyl chlorides with aqueous KOH leads to the formation of alcohols but in the presence of alcoholic KOH, alkenes are major products. Explain.

13. Write the method of preparation of haloalkanes: a) By electrophilic substitution, b) Sandmeyer's reaction c) From Alkenes

14. Explain Finkelstein's and Swarts reaction?

15. Haloalkanes react with KCN to form alkyl cyanides as main product while AgCN forms isocyanides as the chief product. Explain.

16. Differentiate between inversion and racemisation with an example?

17. What do you mean by chiral and achiral atom? Differentiate with an example

18. Explain: a) Friedel-Craft Reaction, b) Sulphonation, c) Wurtz-Fittig Reaction
d) Nitration

19. Why Wurtz reaction fails in case of tert-alkyl halides ?

20. Which of the following has the highest dipole moment and Why?

CH₂Cl₂, CHCl₃, CCl₄

21. Why is sulphuric acid not used during the reaction of alcohol with KI?

22. How will you bring about the following conversions:

- a. Bromomethane to propanone
- b. 2-chlorobutane to 3,4-dimethylhexane
- c. 2-methyl-1-propene to 2-chloro-2-methylpropane

- d. Ethyl chloride to propanoic acid
- e. Chloroethane to butane
- f. 2-chloropropane to 1-propanol

23. Why C-X bond length in halo benzene is smaller than C-X bond length in $\text{CH}_3\text{-X}$?

24. Why is (dl)-butan-2-ol optically inactive?

25. Compound "A" with molecular formula $\text{C}_4\text{H}_9\text{Br}$ is treated with aq. KOH solution.

The rate of this reaction depends upon the concentration of the compound A only.

When another optically active isomer B of this compound was treated with aq. KOH solution the rate of reaction was found to be dependent on conc. of compound and KOH both.

(a) Write down the structural formula of both compound "A" and

B'. (b) Out of these two compounds which one will be converted to the product with inverted configuration.