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Jars Education

Shop no. 2,3,4 hendre pada Badlapur west thane

Time : 1 Hour 15 Minute

STD 11 Science Chemistry
Chapter Based Test

Total Marks : 40

SECTION A

* **Choose The Right Answer From The Given Options.[1 Marks Each]** **[6]**

1. Passing H_2S gas into a mixture of Mn^{2+},Ni^{2+},Cu^{2+},Hg^{2+} ions in acidified aqueous solution precipitates:

   (A) CuS and HgS (B) MnS and CuS

   (C) MnS and NiS (D) NiS and HgS

2. The indicator which is used to find the strength of caustic soda solution with the help of oxalic acid is:

   (A) Methyl orange (B) Phenolphthalein

   (C) Potassium permanganate (D) None of the above

3. The elements always present in organic compounds are C and H. In addition to these, name the other elements that may be present in it:

   (A) Oxygen and nitrogen. (B) Sulphur and halogens.

   (C) Phosphorus. (D) All of these.

4. Which of the following elements in an organic compound cannot be detected by Lassaigne's test?

   (A) Nitrogen (B) Sulphur (C) Chlorine (D) Hydrogen

5. Which general formula represents the homologous series of hydrocarbons that includes the compound 1-heptyne?

   (A) C_nH_{2n-6} (B) C_nH_{2n}

   (C) C_nH_{2n-2} (D) C_nH_{2n+2}

6. Homologous series is_____.

   (A) A series of compounds in which the same functional group substitutes for hydrogen in a carbon chain.

   (B) A series of compounds in which different functional group substitutes for hydrogen in a carbon chain.

   (C) A series of compounds with same molecular formula and different structural formulae.

   (D) A series of compounds with same molecular formula but different functional groups.

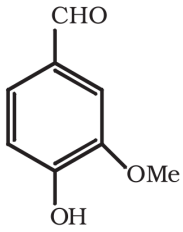
* **Answer The Following Questions In One Sentence.[1 Marks Each]** **[5]**

7. Identify the reagents shown in bold in the following equations as nucleophiles or electrophiles:

$$\mathrm{CH_3COOH_3} + \mathrm{\overset{-}{C}N} \rightarrow (\mathrm{CH_3})_2\mathrm{C(CN)(OH)}$$

8.

Identify the functional groups in the following compounds:



9. How will you separate a mixture of o-nitrophenol and p-nitrophenol?

10. Which of the following compounds will not exist as resonance hybrid. Give reason for your answer:
CH_3OH

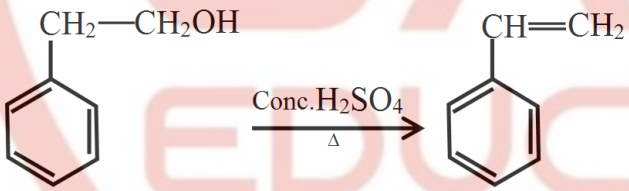
11. Which of the following compounds will not exist as resonance hybrid. Give reason for your answer:
$R\text{-}CONH_2$

SECTION B

*** Given Section consists of questions of 2 marks each.** **[6]**

1. Classify the reaction type as elimination, rearrangement, addition and substitution.

i.



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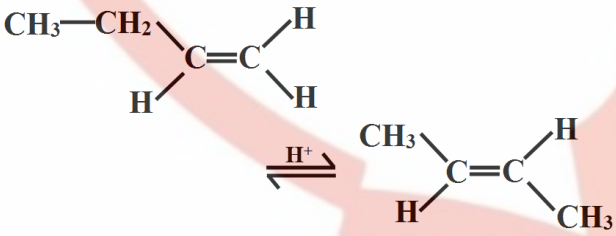
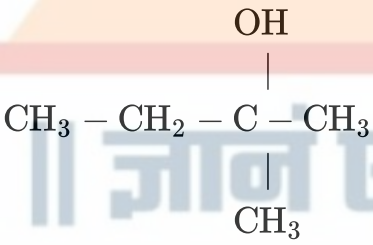
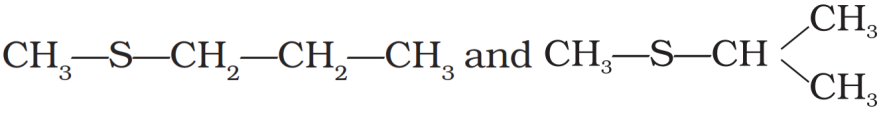


iii. $CH_3 - CH(Br) - CH(CH_3)_2 \xrightarrow{\text{aq. KOH}}$

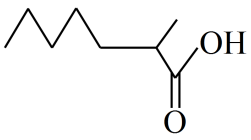


2. Compounds with same molecular formula but differing in their structures are said to be structural isomers. What type of structural isomerism is shown by.



3. Expand each of the following bond line formula to show all the atoms including carbon and hydrogen.

i.



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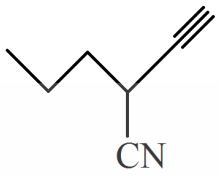
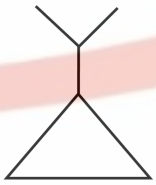


iii.



SECTION C

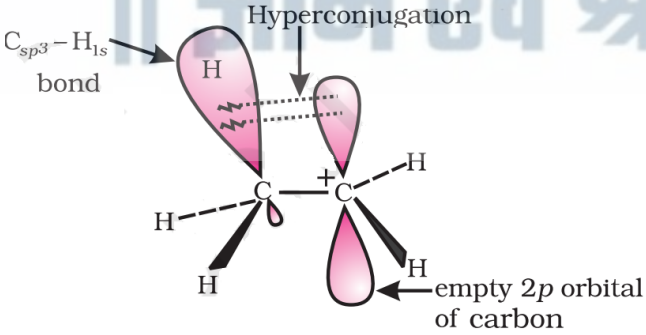
*** Given Section consists of questions of 3 marks each.** **[9]**

1. Why is nitric acid added to sodium extract before adding silver nitrate for testing halogens?
2. Write down the formulae of the first four members of each homologous series beginning with the following compounds.
   i. $CH_2 = CH_2$
   ii. $HCOOH$
   iii. CH_3COCH_3
   iv. CH_3OH
   v. $HC \equiv CH$
3. In DNA and RNA, nitrogen atom is present in the ring system. Can Kjeldahl method be used for the estimation of nitrogen present in these? Give reasons.

SECTION D

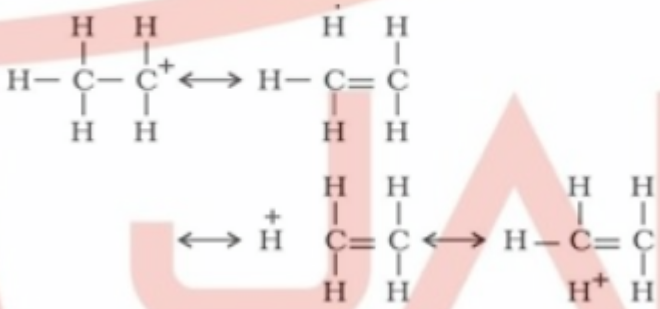
*** Case study based questions** **[4]**

1. Read the passage given below and answer the following questions from 1 to 5.



Hyperconjugation is a general stabilising interaction. It involves delocalisation of σ electrons of C—H bond of an alkyl group directly attached to an atom of unsaturated system or to an atom with an unshared p orbital. The σ electrons of C—H bond of the alkyl group enter into partial conjugation with the attached unsaturated system or with the unshared p orbital. Hyperconjugation is a permanent effect. To understand hyperconjugation effect, let us take an example of CH 32 + (ethyl cation) in which the positively charged carbon atom has an empty p orbital. One of the C-H bonds of the methyl group can align in the plane of this empty p orbital and the electrons constituting the C-H bond in plane with this p orbital can then be delocalised into the empty p orbital as depicted in Figure.

This type of overlap stabilises the carbocation because electron density from the adjacent σ bond helps in dispersing the positive charge.



In general, greater the number of alkyl groups attached to a positively charged carbon atom, the greater is the hyperconjugation interaction and stabilisation of the cation. Thus, we have the following relative stability of carbocations:

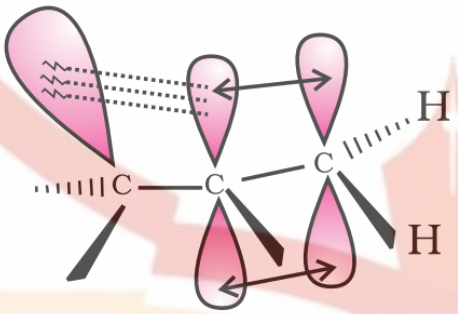
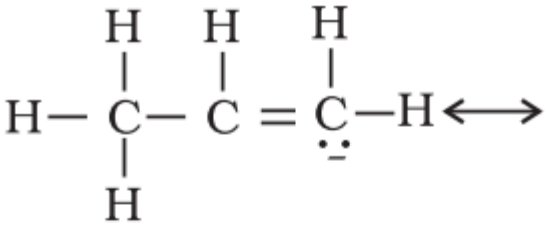


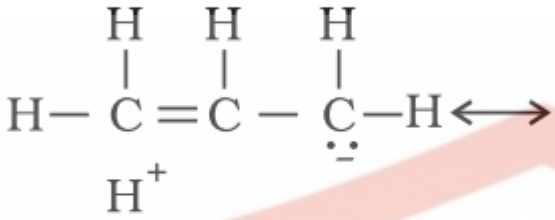
Fig. 12.4(b) *Orbital diagram showing hyperconjugation in propene*

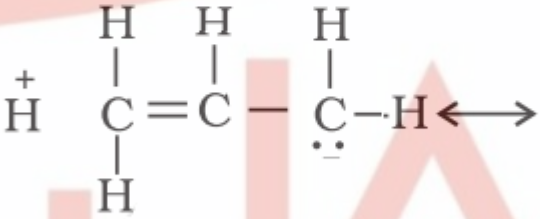
Hyperconjugation is also possible in alkenes and alkylarenes. Delocalisation of electrons by hyperconjugation in the case of alkene can be depicted as in Figure.

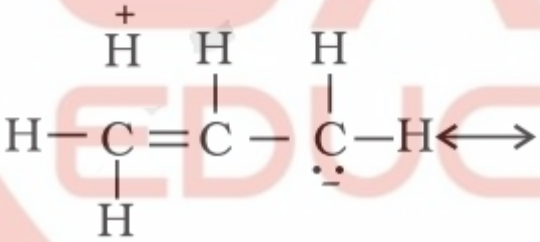
There are various ways of looking at the hyperconjugative effect. One of the way is to regard C—H bond as possessing partial ionic character due to resonance.

The hyperconjugation may also be regarded as no bond resonance.









The hyperconjugation may also be regarded as no bond resonance.

Methods of purification of organic compounds Once an organic compound is extracted from a natural source or synthesised in the laboratory, it is essential to purify it. Various methods used for the purification of organic compounds are based on the nature of the compound and the impurity present in it. The common techniques used for purification are as follows :

i) Sublimation

ii) Crystallisation

iii) Distillation

iv) Differential extraction and

v) Chromatography

Finally, the purity of a compound is ascertained by determining its melting or boiling point. Most of the pure compounds have sharp melting points and boiling points. New methods of checking the purity of an organic compound are based on different types of chromatographic and spectroscopic techniques.

Sublimation On heating, some solid substances change from solid to vapour state without passing through liquid state. The purification technique based on the above principle is known as sublimation and is used to separate sublimable compounds from non- sublimable impurities.

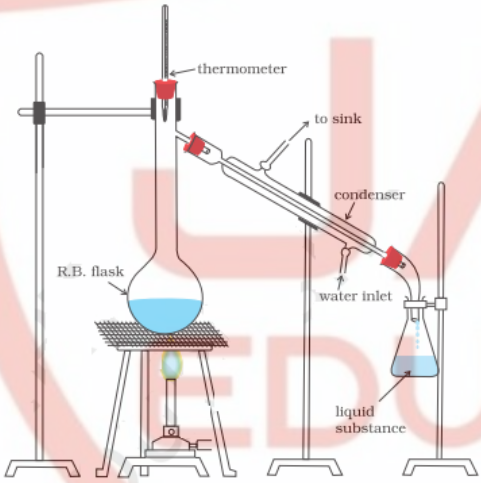
Crystallisation This is one of the most commonly used techniques for the purification of solid organic compounds. It is based on the difference in the solubilities of the

compound and the impurities in a suitable solvent. The impure compound is dissolved in a solvent in which it is sparingly soluble at room temperature but appreciably soluble at higher temperature. The solution is concentrated to get a nearly saturated solution. On cooling the solution, pure compound crystallises out and is removed by filtration. The filtrate (mother liquor) contains impurities and small quantity of the compound. If the compound is highly soluble in one solvent and very little soluble in another solvent, crystallisation can be satisfactorily carried out in a mixture of these solvents. Impurities, which impart colour to the solution are removed by adsorbing over activated charcoal. Repeated crystallisation becomes necessary for the purification of compounds containing impurities of comparable solubilities.

Distillation This important method is used to separate

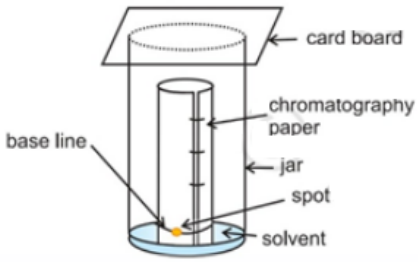
i) volatile liquids from nonvolatile impurities and

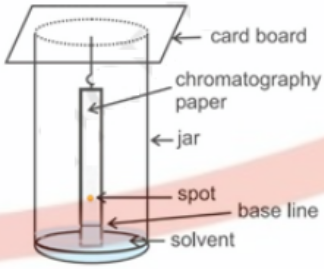
ii) the liquids having sufficient difference in their boiling points.



Liquids having different boiling points vaporise at different temperatures. The vapours are cooled and the liquids so formed are collected separately. Chloroform (b.p 334 K) and aniline (b.p. 457 K) are easily separated by the technique of distillation (Fig 12.5). The liquid mixture is taken in a round bottom flask and heated carefully. On boiling, the vapours of lower boiling component are formed first. The vapours are condensed by using a condenser and the liquid is collected in a receiver. The vapours of higher boiling component form later and the liquid can be collected separately.

Partition Chromatography: Partition chromatography is based on continuous differential partitioning of components of a mixture between stationary and mobile phases. Paper chromatography is a type of partition chromatography. In paper chromatography, a special quality paper known as chromatography paper is used. Chromatography paper contains water trapped in it, which acts as the stationary phase. A strip of chromatography paper spotted at the base with the solution of the mixture is suspended in a suitable solvent or a mixture of solvents (Fig. 12.13). This solvent acts as the mobile phase. The solvent rises up the paper by capillary action and flows over the spot. The paper selectively retains different components according to their differing partition in the two phases. The paper strip so developed is known as a chromatogram. The spots of the separated coloured compounds are visible at different heights from the position of initial spot on the chromatogram. The spots of the separated colourless compounds may be observed either under ultraviolet light or by the use of an appropriate spray reagent as discussed under thin layer chromatography.





i. Hyperconjunction involves delocalisation of ... electrons of C—H bond of an alkyl group directly attached to an atom of unsaturated system or to an atom with an unshared p orbital.
   a. σ
   b. π
   c. δ
   d. η

ii. Which of the is an example of technique used for purification.
   a. Distillation
   b. Differential extraction
   c. Chromatography
   d. All the above

iii. On heating, some solid substances change from solid to vapour state without passing through liquid state is known as ...
   a. Melting
   b. Boiling
   c. Sublimation
   d. Condensation

iv. The hyperconjugation may also be regarded as ....
   a. bonding resonance
   b. no bond resonance
   c. no bond induction
   d. bonding induction

v. Chromatography paper contains water trapped in it, which acts as the ... phase.
   a. mobile
   b. stationery
   c. Secondary
   d. quaternary

SECTION E

*** Given Section consists of questions of 5 marks each.** **[10]**

1. Why is a solution of potassium hydroxide used to absorb carbon dioxide evolved during the estimation of carbon present in an organic compound?
2. Explain the terms Inductive and Electromeric effects. Which electron displacement effect explains the following correct orders of acidity of the carboxylic acids?
   i. $Cl_3CCOOH > Cl_2CHCOOH > ClCH_2COOH$.
   ii. $CH_3CH_2COOH > (CH_3)_2CHCOOH > (CH_3)_3C.COOH$.

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