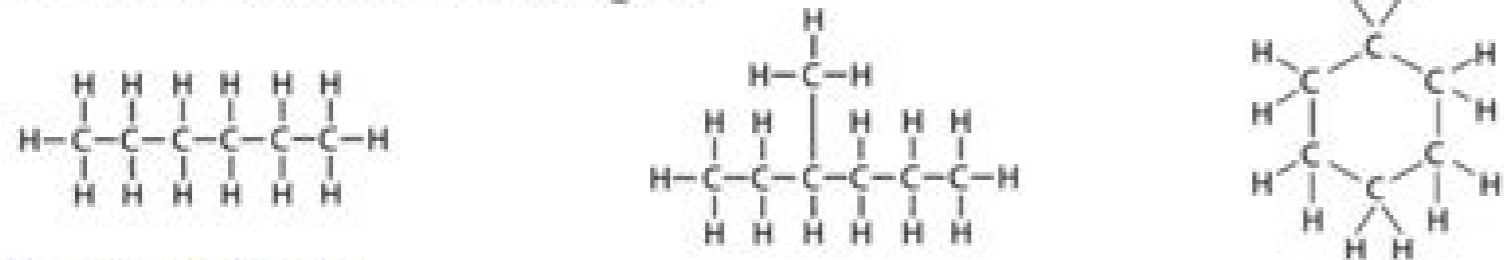


Continue

Guess the property by which carbon atoms form long or branched chains or even arrange themselves in rings.



Catenation

Carbon has the unique ability to form bonds with other atoms of carbon, giving rise to large molecules. This property is called catenation.



Check It

Without referring to the textbook, try to answer these questions. If you cannot answer a question, look up the relevant section in your textbook.

13.1 Oxidation Reactions

- Which conversion is an example of oxidation?
 - A Carbon dioxide to carbon monoxide.
 - B Concentrated hydrochloric acid to chlorine.
 - C Copper(II) oxide to copper.
 - D Sodium hydroxide to sodium nitrate.

(B)
- Which gaseous substance has nitrogen in its **lowest** oxidation state?
 - A N₂O
 - B NH₃
 - C NO
 - D NO₂

(B)

13.2 Reduction Reactions

- Which underlined substance has been reduced?
 - A N₂ to NH₃
 - B NH₃ to NO
 - C NH₃ to NO₃⁻
 - D NO₃ to NO₃⁻

(A)

13.3 Redox Reactions

- What happens to a bromine atom when it is changed to a bromide ion?
 - A It is oxidised.
 - B It is reduced.
 - C It loses a proton.
 - D It loses an electron.

(B)
- Which reaction is **not** a redox reaction?
 - A 2Fe³⁺(aq) + 2I⁻(aq) → 2Fe²⁺(aq) + I₂(aq)
 - B 2Na(s) + Cl₂(g) → 2NaCl(s)
 - C Ag⁺(aq) + Cl⁻(aq) → AgCl(s)
 - D Mg(s) + 2Ag⁺(aq) → Mg²⁺(aq) + 2Ag(s)

(C)

13.4 Oxidising and Reducing Agents

- Which substance cannot reduce iron(III) oxide to iron?
 - A Carbon dioxide
 - B Carbon monoxide
 - C Coke (carbon)
 - D Hydrogen

(A)
- Why does the colour of potassium iodide change to brown when chlorine is bubbled through it?
 - A A compound is formed between chlorine and potassium iodide.
 - B Chlorine oxidises iodide ions to iodine.
 - C Iodine reacts with starch to give a blue colour.
 - D Potassium chloride is formed which is coloured.

(B)

These structures are helpful in explanation of chemical reactivity or the chemical reaction of the compound that they are not real resonance phenomenon in the result of mesomeric effect or delocalisation.

(i) Resonating structure are not the real structures of conjugated compounds.

(ii) The real structure of conjugated compound is a hybrid of all resonating structures. This phenomenon is known as resonance, mesomerism or delocalisation.

(iii) This resonance is nothing but hybridisation of resonating structures and resonance phenomenon will take place in conjugated compounds.

(iv) **Conditions of Resonating Structures :** Resonance structures should follow following conditions :

(a) All resonating structures must have the same arrangement of atomic nuclei. Resonance differs from isomerism in this very important aspect.

$$\begin{array}{c} \text{O} \\ \parallel \\ \text{R}-\text{C}-\text{O}-\text{H} \end{array} \longleftrightarrow \begin{array}{c} \text{O} \\ \parallel \\ \text{R}-\text{C}-\text{O}^--\text{H}^+ \end{array}$$

Positions of atomic nuclei in (i) and (ii) are same.

$$\begin{array}{c} \text{O} \\ \parallel \\ \text{CH}_3-\text{C}-\text{CH}_3 \end{array} \quad \begin{array}{c} \text{OH} \\ | \\ \text{CH}_3-\text{C}-\text{CH}_3 \end{array}$$

Positions of hydrogen nuclei in (i) and (ii) are different, hence (i) and (ii) are not resonating structures, they are isomers.

(b) The resonating structures must have the same numbers of paired and unpaired electrons. However, they differ in the way of distribution of electrons.

$$\begin{array}{c} \text{O} \\ \parallel \\ \text{O}=\text{N}-\text{O} \end{array} \longleftrightarrow \begin{array}{c} \text{O} \\ \parallel \\ \text{O}^--\text{N}^+=\text{O} \end{array}$$

Total number of paired electrons = 16 Total number of paired electrons = 16
 Total number of unpaired electrons = 2 Total number of unpaired electrons = 2

The energy of the different resonating structures must be the same or nearly the same.

All atoms that are part of the delocalisation system must be in a plane or be nearly planar.

(vi) All atoms of the resonating structure should follow the octet rule.

For Example: All atoms follow octet rule.

Structure does not follow the octet rule hence (ii) is not resonating structure (ii)

Conditions for resonance :

- If there are two π bonds at alternate position then π of one π bond are transferred towards another π bond. (According to 1-effect).

RING NOMENCLATURE OF ALICYCLIC COMPOUNDS :

(i) The name of cyclic compounds are named by adding the prefix 'cyclo'.

Cyclohexane

Cyclopentane

(ii) The numbering of the carbon atoms in the ring is done in such a way that the substituent which comes first in the alphabetical order is given the lowest possible number provided it does not violate the name of the parent ring.

Example :

1-Ethyl-3-methylcyclopentane

2-Ethyl-1,4-dimethylcyclopentane

3-Ethyl-1,4-dimethylcyclopentane

(iii) When the ring contains two or more number of carbon atoms then the shell group attached to it, then it is named as a derivative of cyclohexane and the shell group is named as substituent.

Example :

Methylcyclohexane

Propylcyclohexane

(iv) The shell chain contains greater number of carbon atoms than present in the ring, the compound is considered as the derivative of alkane and the ring is designated as substituent.

Example :

Propylcyclohexane

Propylcyclohexane

(v) If ring has unsaturated and side chain is saturated then ring is selected as parent chain.

If side chain has unsaturated and ring is saturated then side chain is selected as parent chain.

If both have unsaturated then side with maximum unsaturation has selected as parent chain.

If equal unsaturation then longer chain is selected as parent chain.

If unsaturation and number of carbon atoms both are equal then ring is selected as parent chain.

Example :

1-Ethylcyclohex-1-ene

6-Ethyl-3,3-dimethylcyclohex-1-ene

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