

CLASS 10

SCIENCE

EXTRA QUESTIONS

Extra Questions: Class 10 Science Chapter 4 Carbon and its Compounds

Fresh HOTS-level problems on carbon compounds beyond the standard exercise. See the standard-level Solutions first if you haven't already.

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Extra Questions (HOTS Level): Carbon and its Compounds (Class 10 Science Chapter 4)

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Extra Questions (HOTS Level): Carbon and its Compounds (Class 10 Science Chapter 4)

Q1. An organic compound X with molecular formula C_2H_6O turns blue litmus red only when a catalyst oxidises it further to Y. Identify X and Y and write the oxidation equation.

X = ethanol (C_2H_5OH) — itself neutral to litmus. On oxidation (e.g. with alkaline $KMnO_4$ /acidified $K_2Cr_2O_7$), it forms Y = ethanoic acid (CH_3COOH), which is acidic and turns blue litmus red.

Equation: $CH_3CH_2OH + 2[O] \rightarrow CH_3COOH + H_2O$.

Q2. Assertion-Reason: Assertion (A): Diamond and graphite are both allotropes of carbon but have very different physical properties. Reason (R): The atoms in diamond and graphite are arranged differently, giving different bonding structures. Choose: (i) Both true, R explains A (ii) Both true, R doesn't explain A (iii) A true, R false (iv) A false, R true.

Diamond has a rigid 3D tetrahedral network (each C bonded to 4 others) making it extremely hard, while graphite has layers of hexagonal rings (each C bonded to 3 others) that slide over each other, making it soft and a good lubricant/conductor. The different atomic arrangement directly explains the different properties.

Answer: (i).

Q3. Two test tubes contain hexane and hexene respectively. Bromine water is added to both and shaken. Predict the observation in each and explain.

Hexene (unsaturated, has a $C=C$ double bond) decolourises the bromine water instantly via an addition reaction.

Hexane (saturated alkane) shows **no immediate decolourisation** under normal conditions, since it has no double/triple bond for bromine to add across.

Q4. A compound has the molecular formula $C_4H_{10}O$ and reacts with sodium metal to liberate hydrogen gas but does not react with sodium carbonate. Identify the functional group present and justify.

Both alcohols and carboxylic acids react with sodium to liberate H_2 gas, but only carboxylic acids react with sodium carbonate (releasing CO_2). Since this compound reacts with Na but NOT with Na_2CO_3 , it must contain an **—OH (alcohol) functional group**, not a carboxylic acid group.

Q5. Write the structural formula and name of the first three members of the alkyne homologous series, and state their general formula.

General formula: C_nH_{2n-2} .

Ethyne (C_2H_2): $H-C\equiv C-H$.

Propyne (C_3H_4): $CH_3-C\equiv C-H$.

Butyne (C_4H_6): $CH_3-CH_2-C\equiv C-H$.

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