

## 10 Scenario-Based CBC Items on Hydrocarbons for A' Level S5

### 1. Managing Plastic Waste in Schools

Scenario: At your school, the administration has observed that students frequently dispose of plastic water bottles and snack wrappers in the open, leading to littering. The science department proposes an initiative to collect these plastics and use chemical methods to convert them into useful hydrocarbons.

Task: Help your science club to:

- Explain how plastics are related to hydrocarbons.
- Suggest a feasible method for converting plastic waste into fuel.
- Discuss how this method would reduce environmental pollution.

### 2. Kerosene Contamination in Rural Homes

Scenario: In a rural community, residents often use kerosene for cooking and lighting. However, due to poor storage, the kerosene often becomes contaminated with water, reducing its effectiveness. People suspect it has something to do with the chemical nature of the fuel.

Task: Assist the community by:

- Explaining the structure and nature of kerosene as a hydrocarbon.
- Suggesting how to detect water contamination in hydrocarbons.
- Recommending better storage practices to maintain fuel quality.

### 3. Fuel Efficiency Debate

Scenario: A group of boda boda riders argue over which type of fuel is more efficient: petrol or diesel. They are confused about the chemical reasons behind their differences.

Task: Prepare a presentation that:

- Compares the hydrocarbons in petrol and diesel.
- Explains their energy output in relation to chain length and saturation.
- Advises which is better in terms of cost and environmental impact.

#### **4. Lubricants from Crude Oil**

Scenario: A mechanic in your town wants to know how engine lubricants are obtained from crude oil. He is particularly curious about the role of hydrocarbons.

Task: Support him by:

- a) Explaining how hydrocarbons are separated from crude oil.
- b) Identifying types of hydrocarbons used in making lubricants.
- c) Describing the desirable properties of hydrocarbon-based lubricants.

#### **5. Odour Problem from Sewer Systems**

Scenario: Your village has been facing foul smells from the local sewer system. Experts say it's due to the breakdown of organic matter forming simple hydrocarbons like methane.

Task: Help local leaders by:

- a) Identifying the type of hydrocarbon responsible.
- b) Explaining how it forms.
- c) Suggesting ways to manage or use the gas produced.

#### **6. Youth Innovation for Briquette Fuel**

Scenario: A youth group is making charcoal briquettes and wants to add waste oil to improve fuel quality. They wonder if hydrocarbons in oil could help.

Task: Assist them by:

- a) Explaining the combustion properties of hydrocarbons in waste oil.
- b) Assessing the safety of adding hydrocarbons to solid fuels.
- c) Proposing how to test energy output experimentally.

#### **7. Biogas vs LPG**

Scenario: Farmers in your district are considering switching from LPG to biogas for cooking. They are not sure about the chemical differences between the two fuels.

Task: Educate them by:

- a) Describing the hydrocarbons in LPG and biogas.
- b) Comparing combustion and by-products.
- c) Evaluating the environmental and economic benefits of each.

## **8. Fuel Spill at a Petrol Station**

Scenario: A petrol spill occurred at a local station, releasing fumes that made nearby residents dizzy. The manager wants to understand the risks of hydrocarbon vapors.

Task: Advise him by:

- a) Explaining the volatility of hydrocarbon fuels.
- b) Describing health and fire risks involved.
- c) Suggesting safety measures for spill management.

## **9. Exploring Vegetable Oils as Biofuels**

Scenario: A science project at your school explores using vegetable oil as an alternative fuel. The teacher asks students to explore its chemical structure compared to fossil hydrocarbons.

Task: Contribute by:

- a) Comparing the molecular structure of vegetable oils and fossil hydrocarbons.
- b) Discussing their combustion properties.
- c) Assessing feasibility of vegetable oils as long-term fuel solutions.

## **10. Smoke from Charcoal Stoves**

Scenario: Charcoal stoves in homes produce a lot of smoke, causing coughing and eye irritation. A health worker suggests it is due to incomplete combustion of hydrocarbons.

Task: Help by:

- a) Explaining incomplete combustion in hydrocarbons.
- b) Identifying the harmful products formed.
- c) Suggesting ways to reduce smoke in household cooking.