Organic chemistry and fuels: connected review

Student activity • observation and reasoning

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The question

Can you connect a structure to a process and its consequences?

Apply formula, isomer, separation, combustion and cracking knowledge in original review problems. Explain each correction rather than copying a final answer.

Equipment

- Booklet, pencil, periodic table and optional molecular model kit

Desk activity only; keep small model pieces away from mouths.

Course coverage: Shared-core review: organic introduction, crude oil and alkanes. No new practical procedure.

Plan, model or apparatus sketch

Draw a labelled structure or model to explain your reasoning for this lesson.

Method and reasoning

Read the whole sequence before starting

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1. Draw pentane and calculate its empirical formula.

2. Draw the two structural isomers of C_4H_{10} and explain why rotation does not add another.

3. Sketch a fractionating column and explain why its fractions are mixtures.

4. Balance complete pentane combustion and identify two possible carbon products of incomplete combustion.

5. Complete $C_{12}H_{26} \rightarrow C_9H_{20}$ + ____ and justify why the second product is unsaturated.

6. Correct one error in each answer and record a precise revision action linked to the misconception.

Cleanup

- Return shared equipment and retain corrected reasoning.

Record your evidence

Blank spaces are for your own work

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Reference and task data

Original practice equations: $C_5H_{12} + O_2 \rightarrow CO_2 + H_2O$; $C_{12}H_{26} \rightarrow C_9H_{20} + ____$. These are paper tasks, not class measurements. Use conservation of atoms and carbon valency four. Separate physical separation from chemical conversion.

Task	My structure / working	Reason / correction
Structures / ratios		
Separation / combustion		
Cracking / corrections		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. Give pentane molecular and empirical formulae.

2. Name the two C_4H_{10} isomers.

3. Explain why a fraction has a boiling range.

4. Balance complete pentane combustion.

5. Complete the cracking equation.

6. Explain one health/environmental consequence of incomplete combustion.