Hydrocarbon fuels: oxygen and products

Teacher / technician

YEAR 11 / LESSON 75 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

Staff preparation and answer guidance. Keep separate from student sheets. Written and model-based lesson; no laboratory procedure is implied.

Coverage and delivery

Shared core: 4.11–4.13. Written combustion models only; no carbon monoxide is generated.

Allow about 60 minutes. Follow the student sequence and use the answers to check reasoning.

Requisition • class of 30, working in 15 pairs

Item	Per pair / setup	Class total
Booklet / writing tools	1 per learner	30 sets
Model kit / periodic table	1 set per pair	15 sets

Immediate safety

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

Preparation and delivery

Read alongside the student method

YEAR 11 / LESSON 75 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

1. Provide 30 booklets and 15 model kits or reusable atom counters; no chemicals are needed.

2. Use 10 minutes retrieval, 25 independent/pair tasks, 15 explanation and 10 corrections. Keep first attempts visible.

3. Do not demonstrate oxygen starvation in an enclosed room or deliberately generate CO. Use equations and existing labelled evidence only.

4. Distinguish CO toxicity, CO_2 greenhouse effects and soot particulate pollution; they are different products and effects.

5. Check all carbon valencies, formula subscripts and equation coefficients. Label any supplied numbers as practice data, not class observations.

Close of lesson

• Return shared equipment and retain corrected reasoning.

Check before teaching

Check the cards, reference data and quantities against this requisition. Keep the staff answer guide separate until the checking stage. Supplied numerical practice datasets are labelled examples; they are not class measurements.

Answers and teaching notes

Expected explanations • do not give as experimental observations

YEAR 11 / LESSON 75 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

- $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$.
- $2CH_4 + 3O_2 \rightarrow 2CO + 4H_2O$.
- $CH_4 + O_2 \rightarrow C + 2H_2O$.
- CO is colourless and odourless; its presence is not reliably visible.
- CO reduces the blood's capacity to carry oxygen, depriving tissues of oxygen. Haemoglobin terminology is not required for this specification point.
- From oxygen supplied to the reaction, usually air; the hydrocarbon itself contains only C and H.

References and provenance

Pearson Chemistry specification

CDC carbon monoxide facts

Prepared 22 November 2026. Original wording, tables and questions. Sources inform the concepts and technique; the lesson scope and classroom quantities are explicitly described here. No laboratory trial or final school risk approval is claimed.