Energetics and alkenes: connected review

Student activity • observation and reasoning

YEAR 11 / LESSON 94 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

The question

Can you separate evidence, calculation and explanation?

Review calorimetry and alkene chemistry using original questions. Chemistry learners also revisit bond energies and equilibrium in labelled extension tasks.

Equipment

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

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

Course coverage: Shared: calorimetry and alkenes, tasks/questions 1–4. Chemistry only: tasks/questions 5–6, bond energies and equilibrium.

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. Calculate heat gained by 50.0 g water rising from 20.0 to 24.0 °C using c=4.18 J g^{-1} $°C^{-1}$.

2. If 0.0200 mol reacts in the invented example, calculate approximate molar enthalpy with sign.

3. Draw propene and its syllabus bromine-addition product.

4. Explain a limitation of calorimetry and of a bromine-water identity claim.

5. Chemistry only: calculate ΔH when total bond breaking requires 900 and bond formation releases 1100 kJ mol^{-1}.

6. Chemistry only: predict cooling/compression effects for exothermic $N_2+3H_2 \rightleftharpoons 2NH_3$; explain why a catalyst does not shift equilibrium.

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

Invented practice data: 50.0 g, ΔT=4.0 °C, c=4.18 J g^{-1} $°C^{-1}$ and reacting amount 0.0200 mol. Heat loss is neglected in the calculation, then evaluated. Extension energy totals are illustrative, not a measured reaction.

Task	My structure / working	Reason / correction
Shared calculation		
Shared structure / evidence		
Chemistry-only extension		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. Calculate q.

2. Calculate approximate ΔH.

3. Draw the propene addition product with Br_2.

4. Give one limitation of each evidence type.

5. Chemistry only: calculate bond-energy ΔH.

6. Chemistry only: explain conditions favouring ammonia and the catalyst role.