Reactions of Group 1 metals

Student activity • recorded demonstration

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The question

What observations support grouping lithium, sodium and potassium together?

Analyse teacher-selected RSC recordings of lithium, sodium and potassium reacting with air and water. Record what the footage shows before explaining it. These are recorded demonstrations, not pupil practicals. Use the comparison to recognise a chemical family; detailed electronic explanations are reserved for the clearly labelled extension in Lesson 19.

Equipment

- Student booklet, pencil and periodic table
- Teacher computer, screen, sound and internet for the linked RSC reactivity-of-metals videos
- A timer is optional for replay navigation, not for comparing reaction rates

Recorded/reference activity only. Do not obtain, handle, open, heat or smell the substances shown. No live reactions, gas tests or chemical waste are part of this lesson.

Course coverage: 2.1–2.2: similarities of lithium, sodium and potassium with water; reactions with air and water show a reactivity trend.

Evidence → interpretation → prediction

Observe / retrieve	Explain the evidence	Predict with limits
What is actually shown?	What chemistry supports it?	What remains untested?

Method and reasoning

Read the whole sequence before starting

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1. Read the headings in the evidence table. Predict one similarity between the three metals, clearly labelling it as a prediction.

2. Watch the teacher-selected air-exposure and water-reaction footage once without writing. No chemicals are handled in this lesson.

3. Replay the lithium section and record visible evidence: surface changes, movement, gas bubbles and any indicator change. Write “not shown” for an unobservable feature.

4. Repeat for sodium and potassium. Record flame colours only if visible in the chosen footage; do not invent a flame for every reaction.

5. Separate observations from explanations. Bubbling is visible; identifying the gas as hydrogen uses chemical knowledge or a demonstrated test, not appearance alone.

6. Use the supplied product information to write word equations and balanced symbol equations for the water reactions. Explain what the indicator, if used, suggests about the solution.

7. Compare the reactions qualitatively. Identify why different sample sizes, temperatures or edited clips prevent a fair numerical rate comparison. Use the evidence to propose a reactivity order.

Cleanup

• Keep evidence and corrections together. Return shared cards/counters and equipment; close the recording or reference pages. No chemical waste is generated.

Record your evidence

Blank spaces are for your own work

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Reference and task data

The water reactions produce the metal hydroxide and hydrogen. Use Li, Na and K; water is H_2O and hydrogen gas is H_2. Metal hydroxide solutions are alkaline. The table is deliberately blank: these are your video observations, not supplied experimental results. Air reaction products can be more complicated than a single oxide; no single air-reaction equation is required here.

Metal	What the footage shows	Explanation / limits
Lithium: air		
Lithium: water		
Sodium: air		
Sodium: water		
Potassium: air		
Potassium: water		

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 two similarities in the water reactions, supported by your viewing notes.

2. Write the word equation and balanced symbol equation for sodium with water.

3. What does an indicator change show, and what does bubbling alone fail to prove?

4. State the reactivity order from lithium to potassium and cite qualitative evidence.

5. Explain why a short video is not a controlled numerical comparison of reaction rates.

6. Correct: “Every alkali metal must produce the same flame colour when it touches water.”