

2.1 Group 1 — The Alkali Metals

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1. KEY VOCABULARY

TERM	MEANING
Alkali metal	A Group 1 element — very reactive metal.
Reactivity	How readily an element takes part in reactions.
Hydroxide	A compound containing the OH ⁻ ion; its solution is alkaline.
Shielding	Inner shells reducing the pull of the nucleus on the outer electron.
Tarnish	To dull / react with air on the freshly cut surface.

2. PROPERTIES OF GROUP 1

Physical: soft (cut with a knife), low density (Li, Na, K float on water), low melting points, shiny when freshly cut but quickly tarnish.

Chemical: very reactive — stored under oil to keep air and water away. All have 1 electron in the outer shell.

3. REACTION WITH WATER

metal + water → metal hydroxide + hydrogen

The metal floats, fizzes and moves around. The solution formed is alkaline (turns universal indicator purple).

Lithium → steady fizzing. **Sodium** → melts into a ball, fizzes fast.

Potassium → ignites with a lilac flame.

4. THE TREND DOWN THE GROUP

Reactivity INCREASES down Group 1.

Going down the group, the atoms get bigger — the outer electron is further from the nucleus and is shielded by more inner shells.

So the outer electron is held less strongly and is lost more easily — making the metal more reactive.

5. STORAGE & SAFETY

Stored under oil to stop them reacting with oxygen and water vapour in the air.

Reactions with water produce hydrogen gas and an alkaline solution — done with small pieces and care.

6. THE WHY

Why Group 1 metals are so reactive: they only need to LOSE one outer electron to reach a full, stable shell — and that is energetically easy.

Why reactivity increases down the group: the outer electron is further out and more shielded, so it is lost more easily.

7. COMMON EXAM MISTAKES

- ✗ "Reactivity decreases down Group 1."
- ✓ It INCREASES down Group 1.
- ✗ "The gas given off is oxygen."
- ✓ It is hydrogen — test with a lit splint (squeaky pop).
- ✗ "The solution formed is acidic."
- ✓ It is alkaline — a metal hydroxide forms.

8. SELF-CHECK · cover & quiz

Can you...

1. List three physical properties of Group 1 metals?
2. Write the word equation for a Group 1 metal + water?
3. Describe what you would see for Li, Na and K with water?
4. State and explain the reactivity trend down the group?
5. Explain why the metals are stored under oil?
6. Name the gas produced and the test for it?