2.2 Group 7 — The Halogens

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1. KEY VOCABULARY

TERM	MEANING
Halogen	A Group 7 element — a reactive non-metal.
Diatomic	Exists as molecules of two atoms, e.g. Cl_2, Br_2, I_2.
Halide	The ion or compound formed by a halogen, e.g. chloride Cl^-.
Displacement	A more reactive element takes the place of a less reactive one.
Volatile	Easily turned into a vapour.

2. PROPERTIES & APPEARANCE

HALOGEN	STATE (room temp)	COLOUR
Chlorine	Gas	Pale yellow-green
Bromine	Liquid	Red-brown
Iodine	Solid	Grey solid / purple vapour

3. TRENDS DOWN THE GROUP

Down Group 7: colour gets darker, melting and boiling points increase (gas → liquid → solid).
Reactivity DECREASES down Group 7.
All halogens exist as diatomic molecules and have 7 outer electrons.

4. DISPLACEMENT REACTIONS

A more reactive halogen displaces a less reactive halogen from a solution of its salt.
Example: chlorine + potassium bromide → potassium chloride + bromine. The solution turns orange as bromine forms.
Iodine cannot displace chlorine or bromine — it is the least reactive of the three.

5. USES

Chlorine: kills bacteria in drinking water and swimming pools; used to make bleach.
Iodine: used as an antiseptic.

6. THE WHY

Why halogens react: they need to GAIN one electron to reach a full, stable outer shell.
Why reactivity decreases down the group: the atoms get bigger, so the outer shell is further from the nucleus and more shielded — it is harder to attract an extra electron.

7. COMMON EXAM MISTAKES

✗ "Reactivity increases down Group 7."
✓ It DECREASES down Group 7 (opposite to Group 1).
✗ "Halogens are single atoms."
✓ They are diatomic — Cl_2, Br_2, I_2.
✗ "Bromine displaces chlorine."
✓ Chlorine is more reactive — it displaces bromine.

8. SELF-CHECK · cover & quiz

Can you…

1. Give the state and colour of chlorine, bromine and iodine?
2. State the reactivity trend down Group 7 — and explain it?
3. Predict the products of a halogen displacement reaction?
4. Write a word equation for chlorine + potassium bromide?
5. Explain why halogens are diatomic and reactive?
6. Give one use each for chlorine and iodine?