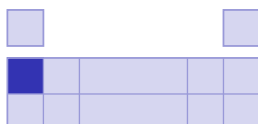


The Periodic Table

IGCSE Chemistry ■ Topic 8

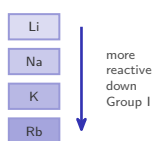
IGCSE Chemistry



The Periodic Table

What we will cover

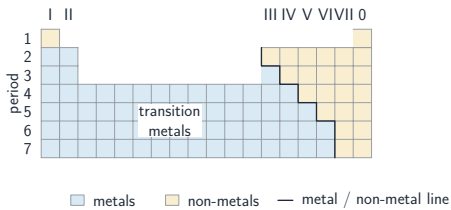
- 1 How the elements are arranged
- 2 Group I – alkali metals
- 3 Group VII – halogens
- 4 Group trends & displacement
- 5 Transition elements
- 6 Group VIII – noble gases



group trends

1 Arrangement

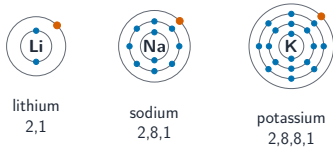
How the elements are arranged



- Across a period, the elements change from **metals** 金属 on the left to **non-metals** 非金属 on the right.
- The group number tells you the charge of the **ions** 离子 that the elements form. Group I forms +1 ions, Group II forms +2 ions, and Group...
- Elements in the same group have similar chemical properties. This is because they have the same number of outer-shell

2 Group I and VII

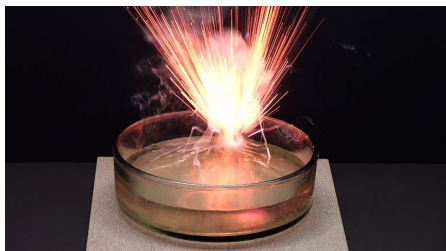
Group I – the alkali metals



every Group I atom has **one** electron in its outer shell (shown in orange), so they react in similar ways

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Group I reactivity



Group I elements are the **alkali metals** 碱金属: **lithium** 锂, **sodium** 钠 and **potassium** 钾.

They are **soft** 柔软 metals (you can cut them with a knife).

Group VII – the halogens

chlorine

pale green gas

bromine

red-brown liquid

iodine

grey-black solid

Halogens 卤素 are **diatomic** 双原子 non-metals (Cl_2). Down the group: density up, reactivity **down**.

Opposite group trends

- Group I: more reactive **down**
- Group VII: less reactive **down**

Metals lose electrons more easily lower down; non-metals gain them less easily.

Group I

Li
Na
K

↓ reactivity increases down

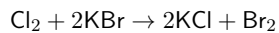
Group VII

Cl
Br
I

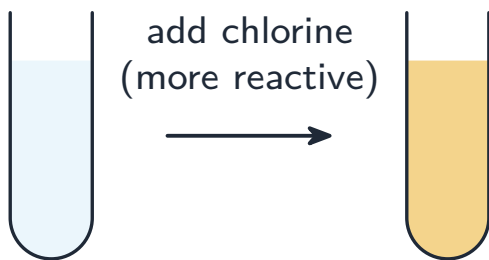
↑ reactivity increases up

Displacement reactions

A more reactive halogen **displaces** 置换 a less reactive **halide** 卤化物.



The released bromine turns the solution orange.



3 Other blocks

Transition elements and noble gases

transition elements 过渡元素

high density & melting point;
coloured compounds; cat-
alysts; variable oxidation
numbers ($\text{Fe}^{2+}/\text{Fe}^{3+}$)

noble gases 稀有气体

Group VIII; **monatomic** 单原子
& unreactive – they al-
ready have a full outer shell

4

Recap

The Periodic Table

└ Recap

Worked example – predicting Group I behaviour

Predict how rubidium reacts with water, compared with sodium.

- Group I reactivity **increases down** the group.
- Rb's outer electron is **further from the nucleus** and more **shielded**.
- So it is **lost more easily** than sodium's.
- Rb reacts **more violently**, giving $\text{RbOH} + \text{hydrogen}$ – and the H_2 ignites.

Group I gets **more** reactive down (easier to **lose** an electron); Group VII gets **less** reactive down (harder to **gain** one). Opposite trends.

The Periodic Table

└ Recap

Topic 8 – key takeaways

1 Arrangement

by proton number; groups share outer electrons

2 Group I

soft metals; more reactive down the group

3 Group VII

diatomic; less reactive down; displacement

4 Other blocks

transition: coloured, catalysts;
noble: inert

Check yourself

- 1 What does the group number tell you about electrons?
- 2 How does Group I reactivity change going down?
- 3 What state is iodine at room temperature?
- 4 Why are noble gases unreactive?

Answers 1. the number of outer-shell electrons 2. it increases 3. a grey-black solid
4. they have a full outer shell