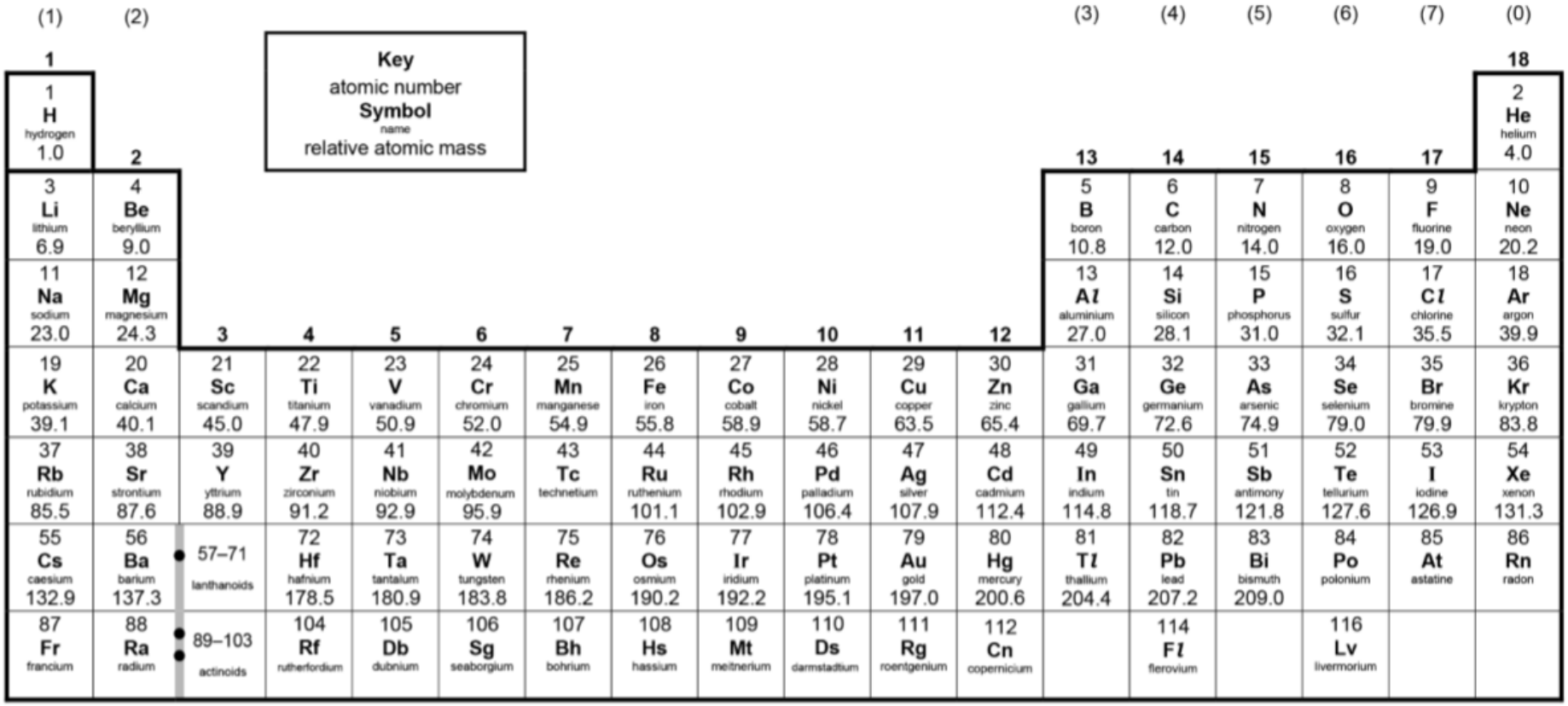
C4.1.1 Group 1
The Alkali Metals

Learning Objectives

- Recall the physical and chemical properties of Group 1 elements
- Predict properties from given trends
- Explain the reactions of Group 1 elements

This is group 1
(ignore Hydrogen)

Group 1 are called the alkali metals as when they react with water they create an alkaline solution



C2.2.2 Revision

Typical metal properties

- Shiny
- High melting and boiling points
- Malleable (bends without breaking)
- Ductile (can be pulled into long thin wires without breaking)
- Good conductors of heat and electricity

How does this link to alkali metals?

Typical metal properties

- *Shiny* ***(only when freshly cut)***
- ~~High melting and boiling points~~
- Malleable (bends without breaking)
- Ductile (can be pulled into long thin wires without breaking)
- Good conductors of heat and electricity

•We will look at lithium, sodium and potassium as they are the only ones safe enough to use in school

• They are so reactive with air and water that they must be stored under oil.

Lithium, sodium, and potassium react with water in a similar way.

metal + water → metal hydroxide + hydrogen

$2M + 2H_2O \rightarrow 2MOH + H_2$

Observations with water

	Observations
All of them (lithium, sodium and potassium)	Floats Moves across the surface of the water Produces bubbles (of hydrogen) If universal indicator is added to the water a change will be seen from green (neutral) to alkaline (purple)
Lithium	Moves **slowly** across the surface of the water
Sodium	Melts to give a spherical shape
Potassium	Moves **quickly** across the surface of the water Catches fire Burns with a **liliac** flame

Trends in reactivity

- Alkali metals lose electrons when they react
- As you go down the group the atoms get bigger
- The electron that is being lost is therefore further away from the nucleus
- It is therefore easier to lose the electron
- Therefore the reactivity **increases** as you go down the group

Trends in physical properties

Density increases as you go down the group (K is an anomaly)

	Density (g/cm^3)
Li	0.53
Na	0.97
K	**0.86**
Rb	1.53
Cs	1.88

Trends in physical properties

Melting point decreases as you go down the group

	Melting Point (°C)
Li	181
Na	98
K	63
Rb	
Cs	29

Can you use this trend to predict the melting point of rubidium?

Trends in physical properties

Melting point decreases as you go down the group

	Melting Point (°C)
Li	181
Na	98
K	63
Rb	39
Cs	29