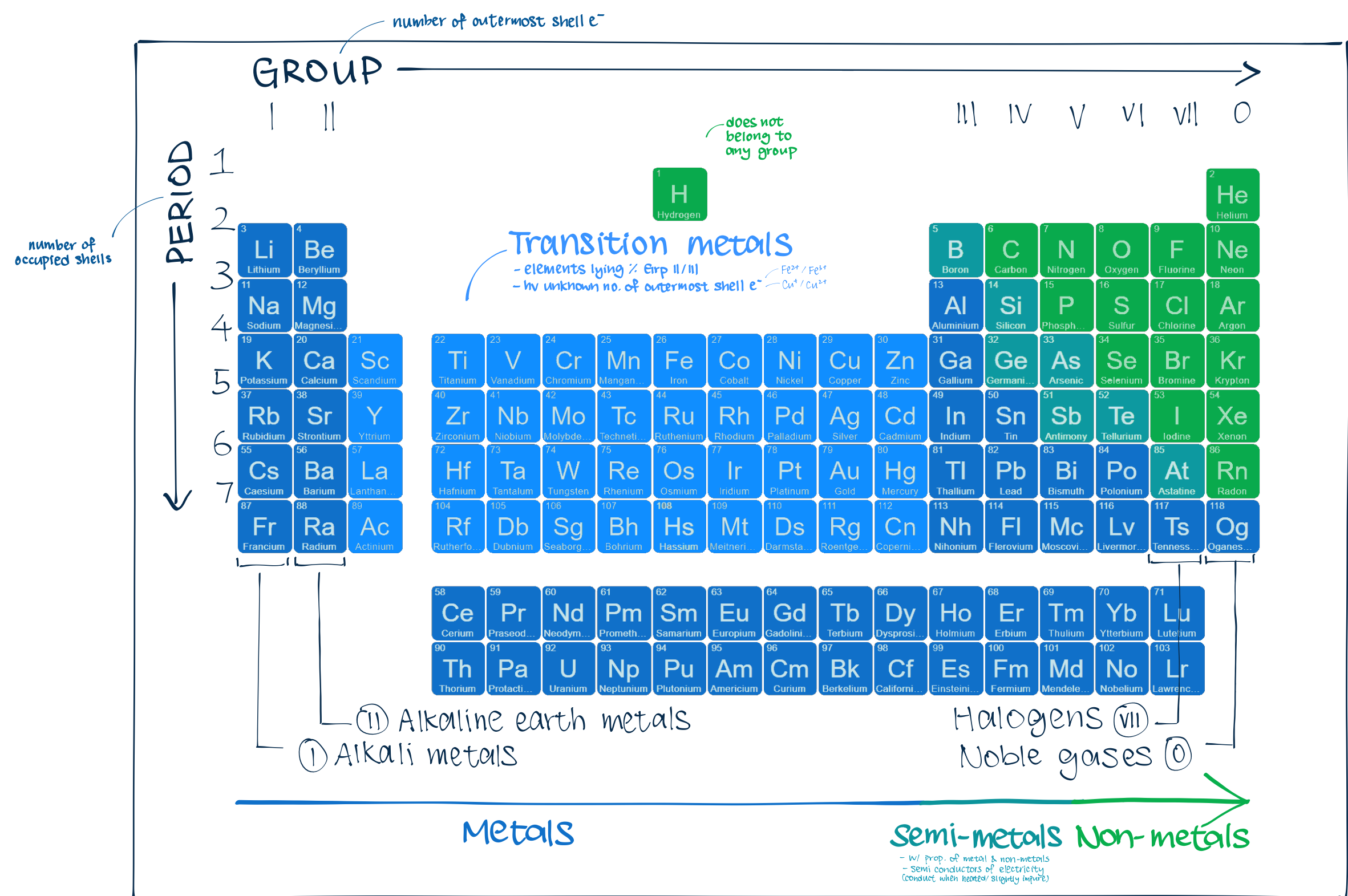


Elements

1 Arrangement - periodic table



2 Main group elements

GRP I - ALKALI METALS

- silvery solids
- soft metals (∇ cut by knife)
- low density (Li, Na, K floats on water)
- reactive
 - > $4M + O_2 \rightarrow 2M_2O \Rightarrow$ stored in paraffin oil
 - > $2M + 2H_2O \rightarrow 2MOH + H_2 \Rightarrow$ gives out hydrogen \Rightarrow alkaline solution
- reactivity increases down the group

GRP II - ALKALINE EARTH METALS

- silvery solids
- low density (but denser than Grp I)
- less reactive than Grp I (harder to lose outermost e^-)
 - > $M + 2H_2O \rightarrow M(OH)_2 + H_2 \Rightarrow$ less vigorous than Grp I \Rightarrow base, insol. in water
- reactivity increases down a group

GRP VII - HALOGENS

- toxic
- \rightarrow Fluorine, Chlorine, Bromine, Iodine, Astatine
 - gas \rightarrow liquid \rightarrow solid m.p./b.p. $\nabla \Rightarrow$ v.h.p.
 - pale yellow \rightarrow greenish \rightarrow reddish brown \rightarrow black colour light \rightarrow dark
- reactivity decreases down a group

GRP 0 - NOBLE GASES

- colourless gases
- very unreactive (duplet/octet electronic structure \rightarrow very stable)

WHY DOES REACTIVITY DIFFER DOWN A GROUP?

- atomic size \uparrow
- attraction ∇ nucleus & outermost shell $e^- \nabla$
- easier to lose / harder to gain e^-
- reactivity increases / decreases

Grp I-III
Grp IV-VII

For more metal reactions see topic 3: Metals

3 Isotopes

DEFINITION

- different atoms of the same element
- w/ same no. of p & e^- but different no. of n
- same chem. prop. (\because same electronic arrangement)
- different phy. prop. (\because different mass)

RELATIVE ABUNDANCE

- proportion of a particular isotope of element in nature
- eg. ^{16}O 99.76%
 ^{17}O 0.04%
 ^{18}O 0.20%

RELATIVE ISOTOPIC MASS

- mass of isotope compared w/ referencing standard $\rightarrow ^{12}C = 12.00$
- \approx mass number $\rightarrow P/M \pm 1, e^- \pm 0$
- no unit (relative value)

4 Relative atomic mass (R.a.m.)

DEFINITION & CALCULATION

- Element
 - Isotope A - Relative isotopic mass A
 - Isotope B - Relative isotopic mass B
 - Isotope C - Relative isotopic mass C
 - all naturally occurring isotopes

weighted average \rightarrow R.a.m.

weight = relative abundance
- R.a.m. = $M_A \cdot a\% + M_B \cdot b\% + M_C \cdot c\% \dots$