Name: _____ Date: _____ Period: _____

SL IB Chem 1 Periodic Trends - Guided Notes

Slide 3: Group numbers - IUPAC

Slide 4: Periods - rows in the PT

- Period number (n) is also the number of energy levels occupied by _____.
- Be careful with the _____ metals (block d).

Slide 5: Group 1 – The alkali metals

Slide 6: Group 17 – The halogens

Slide 7: Group 18 – The Noble gases

Slide 8: The transition metals

Slide 9: Lanthanoids

Slide 10: Actinoids

Slide 11: Actinoids

Slide 12: Periodicity

- The periodic table is arranged to show that properties of elements repeat _____.
- These include:
- _____ nuclear charge
- Atomic radius
- Ionic radius
- Ionization energy
- Electron affinity
- Electronegativity

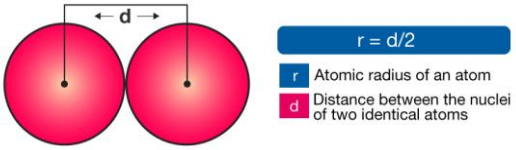
Slide 13: Trends in Effective Nuclear Charge

- **Nuclear charge** is _____ by number of protons in the nucleus.
- **Effective nuclear charge** is the force _____ by outer electrons from the nucleus. It is less than force experienced by inner electrons due to **shielding.**

- _____ across a period
- _____ down a group
- _____ across a period
- Stays the same down a group

Slide 14: Trends in Atomic Radius

- _____ the trends in atomic radius.
- _____ why you think this is the case.
- Think about what _____ the sizes of atoms.



Slide 15: Trends in Atomic Radius

- _____, atomic radius decreases across a period, because…
- more _____ but all being added to the same shell → so shielding does not change.
- more protons in the nucleus = greater nuclear charge, so stronger _____ attraction pulling electrons towards the nucleus.

Slide 17: Trends in Ionic Radius

- _____ ***ions*** smaller than parent atoms due to removal of e- from the outer shell.
- _____ ***ions*** larger than parent atoms due to addition of e- to the outer shell.
- Ionic radii _____ from groups 1 to 14 for cations and groups 14 to 17 for anions due to decrease in nuclear charge.

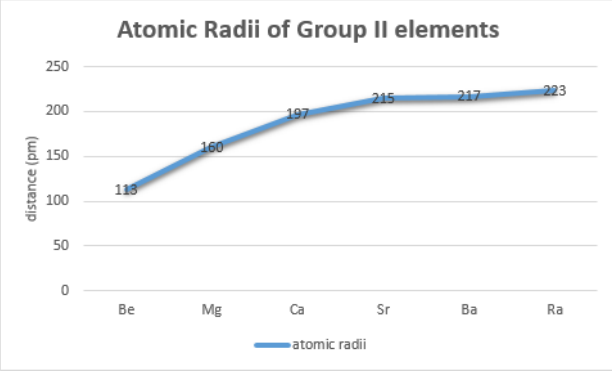
Slide 18: Ionisation Energy

- What is ionisation energy? The energy to remove a mole of electrons from a mole of gaseous atoms.
- What is the first ionisation energy? Removing the first (or 1 electron)

Slide 19: Period 3 - First Ionisation Energy

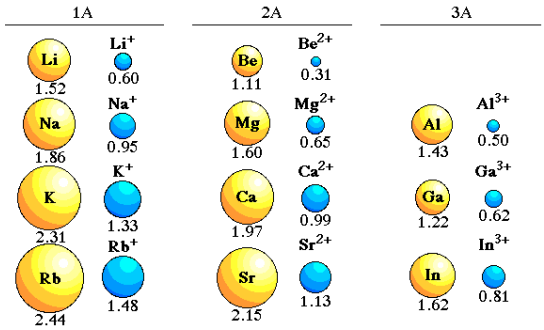
- What is ionisation energy?
- What is the first ionisation energy?
- Write the 1st IE for sodium.
- Trend across period 3 = GENERAL increase.
- Variation only needed for HL.

Slide 20: Atomic radius



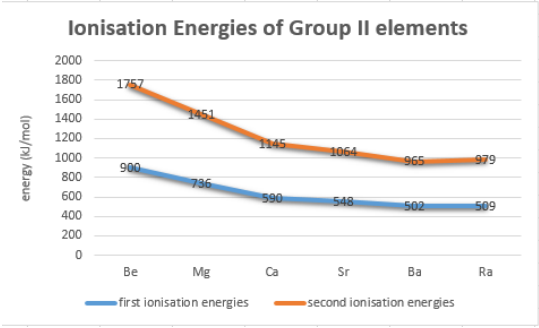
Slide 21: Ion radius vs atom radius

- An ion has a different radius to an atom. Look at chlorine as an example. Compare the subatomic particles of Cl and Cl^-. Which would be smaller and why?



Slide 22: Ionisation energies

- **IE decrease down group 2.** Why?
- More shielding.
- Larger atomic radius.
- Therefore more reactive (less energy needed to remove electrons in order to gain full valence shell).



Slide 23: Electron affinity

- The first electron affinity is the energy released when 1 mole of gaseous atoms each acquire an electron to form 1 mole of gaseous 1- ions.
- This is more easily seen in symbol terms.
- $X_{(g)} + e^- \rightarrow X^-_{(g)}$
- First electron affinities have negative values. For example, the first electron affinity of chlorine is -349 kJ mol^{-1}. By convention, the negative sign shows a release of energy.
- Write equations for the 1st and 2nd electron affinities for Na and Cl.

Slide 24: Electronegativity

- Electronegativity is the power of an atom to pull electrons towards itself

(often in a covalent bond).

- E.g. chlorine attracts electrons more than sodium, even though they have the same number of shells. Why might this be?
- What would be the most electronegative element and why? What would be the least electronegative element and why?

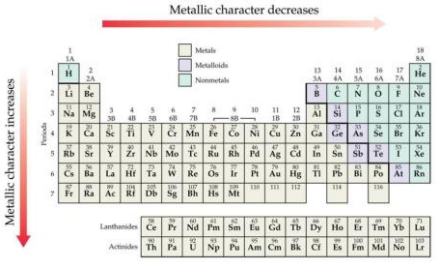
Slide 25: Pauling Scale

- **IN YOUR DATA BOOKS!**

Slide 26: Trends in electronegativity

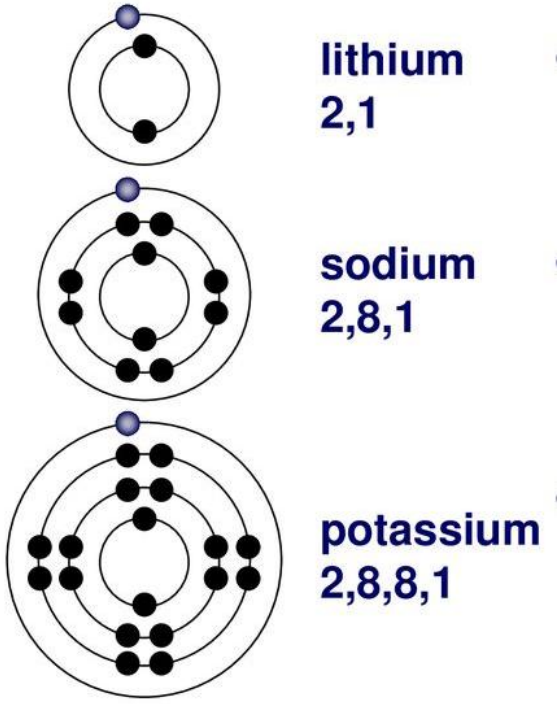
Slide 27: Metallic character

- Metallic character is the name given to the set of chemical _____ associated with elements that are metals. These **chemical properties** result from how readily metals lose their electrons to form cations (positively charged ions).
- **Physical properties** associated with metallic character include metallic luster, shiny appearance, high density, high thermal _____, and high electrical conductivity. Most metals are malleable and ductile and can be deformed without breaking.



Slide 28: Copy and complete the table

Slide 31: Alkali metals and water



Slide 32: Alkali metals and halogens

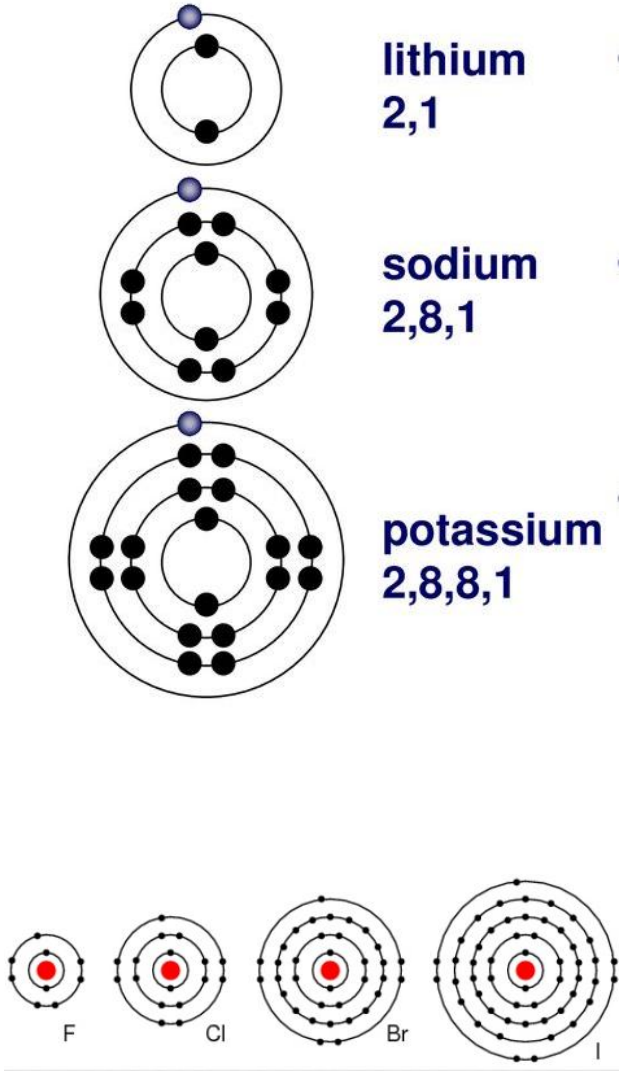
All alkali metals react violently when heated with halogens to form alkali halides. For example,

lithium + chlorine → lithium chloride

$2Li(s) + Cl_2(g) \rightarrow 2LiCl(s)$

sodium + chlorine → sodium chloride

$2Na(s) + Cl_2(g) \rightarrow 2NaCl(s)$



Slide 33: Appearances of the Halogens