AQA Chemistry A-level

Topic 2.1 - Periodicity

Flashcards

How are elements in the periodic table arranged?

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Elements are arranged according to their proton number.

What is a period on the periodic table?

What is a period on the periodic table?

The horizontal rows.

What is a group on the periodic table?

What is a group on the periodic table?

The vertical columns.

What does the group number indicate on the periodic table?

What does the group number indicate on the periodic table?

The number of outer electrons of an element.

What are the 4 blocks of the periodic table?

What are the 4 blocks of the periodic table?

- s-block
- p-block
- d-block
- f-block

What elements are in each block of the periodic table?

What elements are in each block of the periodic table?

- s-block = groups 1 and 2
- p-block = groups 3 to 0
- d-block = transition metals
- f-block = radioactive elements

What is periodicity?

What is periodicity?

The study of trends within the periodic table. Often these trends are linked to elements' electronic configurations.

What is the trend in atomic radius along a period?

What is the trend in atomic radius along a period?

Along a period, atomic radius decreases.

Why does atomic radius decrease along a period?

Why does the atomic radius decrease along a period?

Atomic radius decreases due to an increased nuclear charge for the same number of electron shells.

This means that the outer electrons are pulled in closer to the nucleus because the charge produces a greater attraction.

As a result, the atomic radius is reduced.

What is the trend in atomic radius going down a group?

What is the trend in atomic radius going down a group?

Going down a group, atomic radius increases.

Why does atomic radius increase going down a group?

Why does atomic radius increase down a group?

With each increment down a group, an electron shell is added.

This increases the distance between the outer electrons and the nucleus, reducing the power of attraction.

More shells also increases electron shielding, whereby the inner shells create a ‘barrier’ that blocks the attractive forces.

The nuclear attraction is reduced further and atomic radius increases.

What is the trend in ionisation energy along a period?

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Along a period, ionisation energy increases.

Why does ionisation energy increase along a period?

Why does ionisation energy increase along a period?

It increases because atomic radius decreases, hence nuclear charge increases.

This means that the outer electrons are held more strongly so more energy is required to remove the outer electron and ionise the atom.

What is the trend in ionisation energy going down a group?

What is the trend in ionisation energy going down a group?

Going down a group, ionisation energy decreases.

Why does ionisation energy decrease going down a group?

Why does ionisation energy decrease going down a group?

The nuclear attraction between the nucleus and outer electrons reduces and shielding also increases. Both of these factors mean less energy is required to remove the outer electron.

What does the melting point of Period 3 elements depend on?

What does the melting point of Period 3 elements depend on?

- The structure of the element.
- The bond strength.

What happens to melting points across Period 3 between sodium and aluminium?

What happens to melting points across Period 3 between sodium and aluminium?

Sodium, magnesium and aluminium are all metals with metallic bonding. Their melting points increase due to greater positive charge of their ions (Na = +1, Mg = +2, Al = +3).

This means more electrons are released in the form of free electrons.

This increases the attractive electrostatic forces from Na to Al, therefore more energy is needed to break them.

Why does the melting point increase dramatically for silicone in Period 3?

Why does the melting point increase dramatically for silicone in Period 3?

Silicon has a very strong covalent structure.

So more energy is required to break the strong covalent bonds - giving it a very high melting point

Why does the melting point decrease in Period 3 between phosphorus and chlorine?

Why does the melting point decrease in Period 3 between phosphorus and chlorine?

Phosphorus, sulphur and chlorine are all simple covalent molecules held with weak van der waals forces.

Less energy is needed to overcome these weak intermolecular forces, so these molecule have relatively low melting points.

Why does argon have an even lower melting point than chlorine?

Why does argon have an even lower melting point than chlorine ?

Argon is a noble gas that exists as individual atoms with a full outer shell of electrons.

This makes the atom very stable and the van der waals forces between them very weak.

As a result, less energy is needed to overcome these weak van der waal forces and so argon exists as a gas at room temperature.