

OCR (A) Chemistry A-level

Topic no 3.1.1 - Periodicity

Flashcards

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How are the elements arranged in a periodic table?



How are the elements arranged in a periodic table?

They are arranged in the order of increasing atomic numbers



What is a period on a periodic table?



What is a period on a periodic table?

The horizontal rows in the periodic table



What is a group on a periodic table?



What is a group on a periodic table?

The vertical columns



What is meant by periodicity?



What is meant by periodicity?

The repeating trends in chemical and physical properties



What change happens across each period?



What change happens across each period?

Elements change from metals to non metals



How can the electron configuration be written in short?



How can the electron configuration be written in short?

The noble gas before the element is used to abbreviate

E.g $\text{Li} \rightarrow 1s^2 2s^1$; $\text{Li} \rightarrow [\text{He}] 2s^1$



Define first ionisation energy



Define first ionisation energy

The energy required to remove one electron from each atom in one mole of the gaseous element to form one mole of gaseous $1+$ ions



Write an equation for the first
ionisation energy of
magnesium



Write an equation for the first ionisation energy of magnesium



What are the factors that affect ionisation energy?

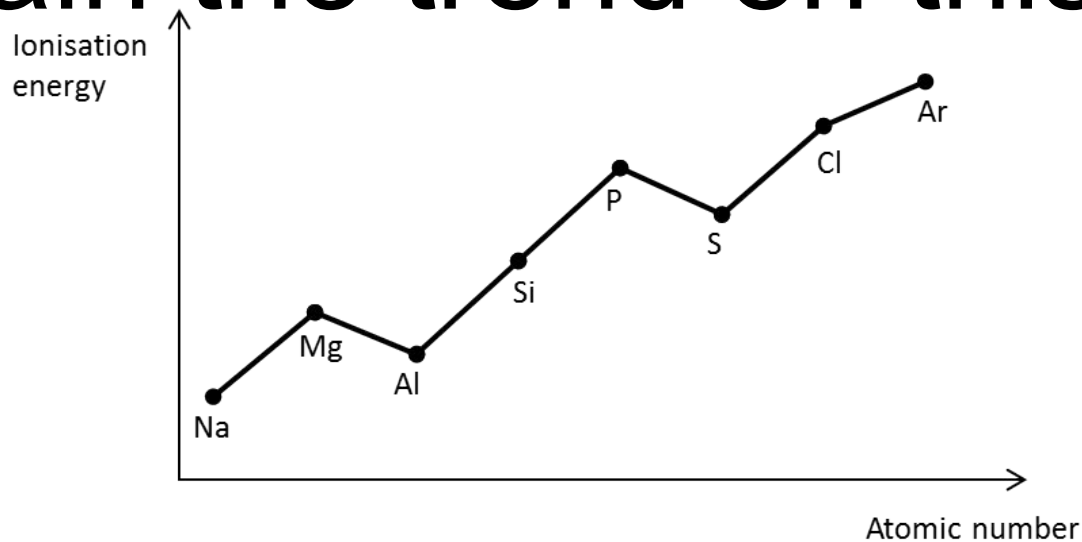


What are the factors that affect ionisation energy?

- Atomic radius
- Nuclear charge
- Electron shielding or screening



Explain the trend on this graph



Explain the trend on this graph

First Ionisation energy increases across period 3 because of:

- Increased nuclear charge
- Decreased atomic radius
- Same electron shielding

which means more energy is needed to remove the first electron.

Dips at Al because: outer electron is in a 3p orbital, higher energy than 3s orbital → less energy needed to remove electron

Dips at S because one 3p orbital contains two electrons → repulsion between paired electrons → less energy needed to remove one



Why does first ionisation energy decrease between group 2 to 3?



Why does first ionisation energy decrease between group 2 to 3 ?

- Decrease between 2 to 3 because in group 3 the outermost electrons are in p orbitals whereas in group 2 they are in s orbital, so the electrons are easier to be removed



Why does first ionisation energy decrease between group 5 to 6?



Why does first ionisation energy decrease between group 5 to 6?

The decrease between 5 to 6 is due to the group 5 electrons in p orbital are single electrons and in group 6 the outermost electrons are spin paired, with some repulsion. Therefore the electrons are slightly easier to remove



Does first ionisation increase or decrease between the end of one period and the start of next? Why?



Does first ionisation increase or decrease between the end of one period and the start of next? Why?

Decrease

- There is increase in atomic radius
- Increase in electron shielding



Does first ionisation increase
or decrease down a group?
Why?



Does first ionisation increase or decrease down a group? Why?

- Decrease
- Shielding increases → weaker attraction
- Atomic radius increases → distance between the outer electrons and nucleus increases → weaker attraction
- Increase in number of protons is outweighed by increase in distance and shielding



What are the properties of giant metallic lattices? (4)



What are the properties of giant metallic lattices?

- High melting and boiling point
- Good electrical conductors
- Malleability
- Ductility



What is a ductile metal?



What is a ductile metal?

The metal can be made stretched. E.g
Can be made into wires



What is a malleable metal?



What is a malleable metal mean?

The metal can be shaped into different forms



Describe the structure, forces
and bonding in every element
across period 2



Describe the structure, forces and bonding in every element across period 2

- Li & Be → giant metallic ; strong attraction between positive ions and delocalised electrons ; metallic bonding
- B & C → giant covalent ; strong forces between atoms ; covalent
- N_2 , O_2 , F_2 , Ne → simple molecular ; weak intermolecular forces between molecules ; covalent bonding within molecules and intermolecular forces between molecules



Describe the structure, forces
and bonding in every element
across period 3



Describe the structure, forces and bonding in every element across period 3

- Na, Mg, Al → giant metallic ; strong attraction between positive ions and delocalised electrons ; metallic bonding
- Si → giant covalent ; strong forces between atoms ; covalent
- P₄ , S₈ , Cl₂ , Ar → simple molecular ; weak intermolecular forces between molecules ; covalent bonding within molecules and intermolecular forces between molecules

