



IONISATION ENERGY – HIGHER HIGHER

First ionisation energy

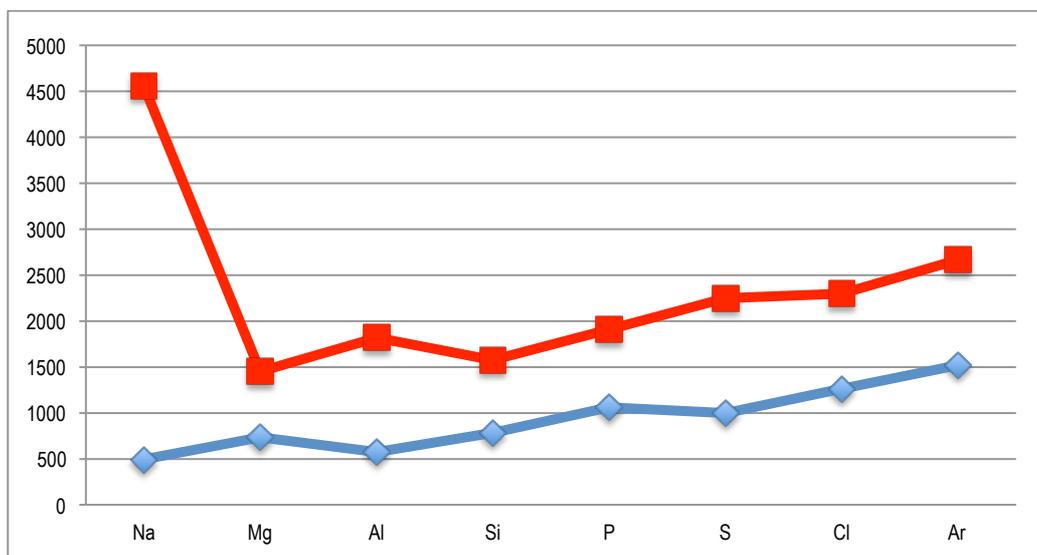
Circle the element with the higher first ionisation energy.

Give the electron structure of each atom. Use this to explain which has the higher first ionisation energy.

	circle the higher one	electron structure	explanation
1	argon v potassium	Ar $1s^2 2s^2 2p^6 3s^2 3p^6$ K $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$	<ul style="list-style-type: none">• electron in Ar is from shell 3, in K it is from shell 4• Ar has smaller atomic radius• Ar has less shielding
2	phosphorus v sulfur	P $1s^2 2s^2 2p^6 3s^2 3p^3$ S $1s^2 2s^2 2p^6 3s^2 3p^4$	<ul style="list-style-type: none">• electron in P is from orbital with 1 electron, in S it is from an orbital with 2 electrons• less electron-electron repulsion in P
3	magnesium v calcium	Mg $1s^2 2s^2 2p^6 3s^2$ Ca $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$	<ul style="list-style-type: none">• electron in Mg is from shell 3, in Ca it is from shell 4• Mg has smaller atomic radius• Mg has less shielding
4	magnesium v aluminium	Mg $1s^2 2s^2 2p^6 3s^2$ Al $1s^2 2s^2 2p^6 3s^2 3p^1$	<ul style="list-style-type: none">• electron in Mg is from 3s, while in Al it is from 3p• 3p is higher energy than 3s
5	oxygen v fluorine	O $1s^2 2s^2 2p^4$ F $1s^2 2s^2 2p^5$	<ul style="list-style-type: none">• F has smaller atomic radius than O• F has more protons than O

Second ionisation energy

The diagram below shows the first ionisation energy for some elements. Sketch a line to show the second ionisation energy for these same elements.



Circle the element with the higher **second** ionisation energy and explain why it is higher.

Give the electron structure of each atom. Use this for your explanation.

	circle the higher one	electron structure	explanation
6	sodium v magnesium	Na ⁺ 1s ² 2s ² 2p ⁶ Mg ⁺ 1s ² 2s ² 2p ⁶ 3s ¹	<ul style="list-style-type: none"> electron in Na⁺ is from shell 2, in Mg⁺ it is from shell 3 Na⁺ has radius smaller Na⁺ has less shielding
7	neon v sodium	Ne ⁺ 1s ² 2s ² 2p ⁵ Na ⁺ 1s ² 2s ² 2p ⁶	<ul style="list-style-type: none"> Na⁺ has smaller radius than Ne⁺ Na⁺ has more protons than Ne
8	sulfur v chlorine	S ⁺ 1s ² 2s ² 2p ⁶ 3s ² 3p ³ Cl ⁺ 1s ² 2s ² 2p ⁶ 3s ² 3p ⁴	<ul style="list-style-type: none"> electron in S⁺ is from orbital with 1 electron, in Cl⁺ it is from an orbital with 2 electrons less electron-electron repulsion in S⁺