

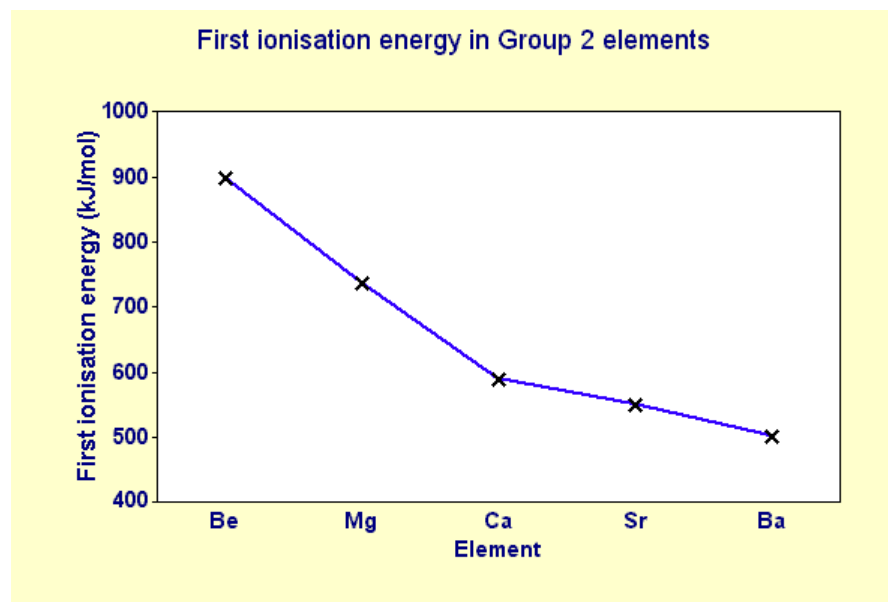
First ionisation energies of Group 2 elements

First ionisation energy decreases going down Group 2.

Table of physical data

Element	Proton number	Symbol	First ionisation energy (kJ/mol)
beryllium	4	Be	900
magnesium	12	Mg	738
calcium	20	Ca	590
strontium	38	Sr	550
barium	56	Ba	503

Graph of physical data



Explanation of this trend

The first ionisation energy is the enthalpy change when one mole of gaseous atoms forms one mole of gaseous ions with a single positive charge. It is an endothermic process, i.e. ΔH is positive.

A general equation for this enthalpy change is: $X(g) \rightarrow X^+(g) + e^-$

Going down Group 2:

- there are more filled energy levels between the nucleus and the outer electron; these shield the outer electron from the attraction of the nucleus ...
- the radius of the atom increases, so the distance between the nucleus and the outer electron increases ...
- therefore the force of attraction between the nucleus and outer electron is reduced ...
- so less energy is needed to remove the outer electron.

As the number of protons in the nucleus increases going down Group 2, you might expect the first ionisation energy to increase because the nuclear charge increases. This does not happen, because the factors described above have a greater influence on the value of the first ionisation energy.