Discussion of answers

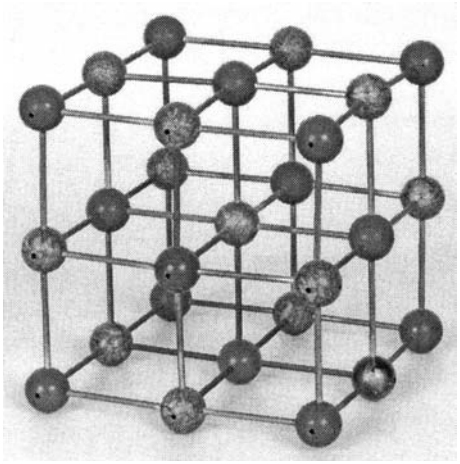
Ionic bonding

Person A is making a sensible point. The information given suggests that the process of electron transfer on its own is strongly endothermic. Since burning magnesium is exothermic, it must involve more than electron transfer.

Person B has abandoned the ionic model too readily. There is good evidence for the existence of ions – *eg* the conductivity of solutions and molten salts. Since magnesium is a metal and oxygen a non–metal, the bonding is ionic.

Person D is correct that the data are about isolated atoms but the real reaction is between solid magnesium and oxygen molecules. However, this observation only gets us so far. You can form the isolated atoms of magnesium and oxygen from the solid and gas by investing the energy to break all the bonds. Breaking the bonds will be endothermic, so we have not explained why the process of burning is exothermic and indeed what drives the magnesium to react with the oxygen.

Person C has made a crucial point. The exothermic part of the whole process comes from the coming together of oppositely charge ions into a giant lattice. Opposite charges have potential energy when they are held apart which is converted to heat when they move closer. The mutual attraction of oppositely charged ions is the driving force behind ionic bonding.



A model of an ionic lattice; the ions are held to each other by electrostatic attraction