Ionic bonding and electron transfer

Introduction

An explanation often given for ionic bonding is that atoms lose or gain electrons to achieve full outer shells. In this activity you will evaluate that as a complete explanation.

The problem

We sometimes explain the formation of ions in terms of atoms transferring electrons in order to gain a full outer shell of electrons (noble gas electron configurations). But for the process:

$$\mathbf{Mg(g) + O(g) \rightarrow Mg^{2+}(g) + O^{2-}(g)}$$
$$\mathbf{\Delta H = +2846\ kJ\ mol^{-1}}$$

The process is extremely **endothermic**!

It requires a large investment of energy to transfer the electrons from Mg to O.

Group discussion task

Read through 'The problem' and then the four opinions expressed: A, B, C and D (on page 2).

Decide in your group whether you agree with all, or any of, each of the opinions and then what your own response to the information is.

What do you think?

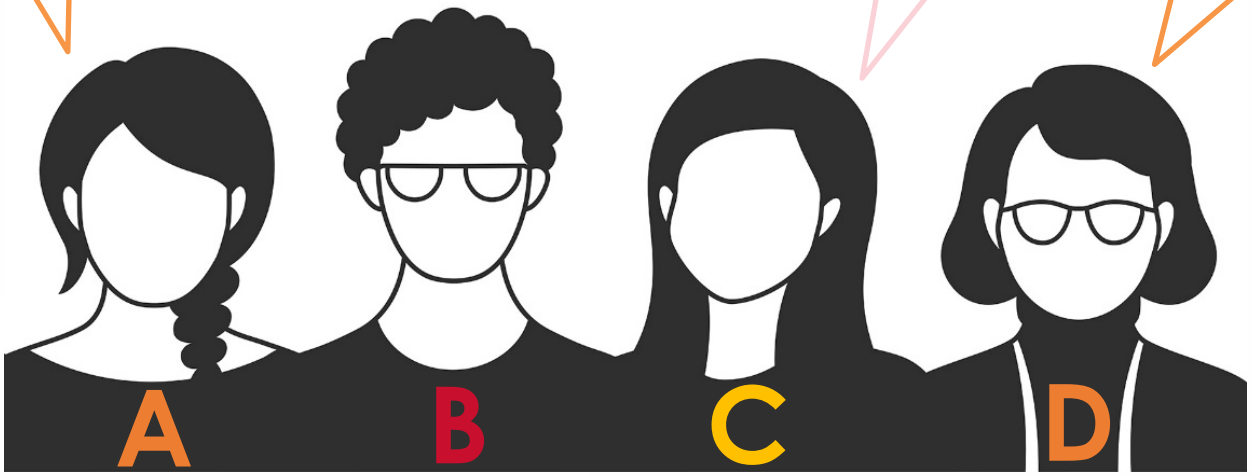
Write your explanation in the box below.

A We know by experience that magnesium burns exothermically so electron transfer cannot be the only thing going on.

B The bonding in magnesium oxide must not be ionic – it must be covalent.

C Ionic bonding occurs because oppositely charged ions attract each other. Energy is given out when the ions come together in a lattice.

D When you react magnesium and oxygen you do not actually have separate atoms. The magnesium is in a giant lattice and the oxygen is in O_2 molecules.



Record your ideas

Opinion	Do you agree? Yes or no?	Explain why…	Either put this into your own words (if you agree) or write a correction (if you don't agree).
A			
B			
C			
D			