Covalent Bonding Notes

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Questions in examination papers that are specific to covalent bonding come in two formats.

1. Definition questions – these will ask for a definition of covalent bonding.
2. Diagrams – These are the most common type of question. These will either give us a partly drawn question with overlapping shells and ask us to draw the correct spread of electrons. Or, they can ask us to draw a diagram of a covalent molecule from scratch.

Let's address the definition type questions first.

A covalent bond: a bond formed between two non-metal elements in which electrons from the outer shells are shared between the atoms.

Covalent bonds are strong because of the **electrostatic attraction between the negatively charged shared pair of electrons and the positively charged nuclei of both atoms** involved in the bond. This is quite strong so covalent bonds require a large amount energy to be broken.

Now let's have a look at the diagram questions. In order to do these questions correctly you MUST understand how many bonds an atom will form and of course this comes back to the number of electrons on its outer shell. I have given a summary table below of the most common atoms that come up for covalent bond diagrams.

Atom	Number of electrons in its outer shell	Number of bonds needed
Hydrogen	1	1
Carbon	4	4
Silicon	4	4
Nitrogen	5	3
Phosphorus	5	3
Oxygen	6	2
Sulfur	6	2
Halogens (F, Cl, Br & I)	7	1

Let's look at a few examples of covalent bond diagrams.

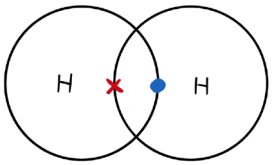


Fig 1.1 A molecule of Hydrogen showing shared pair of electrons.

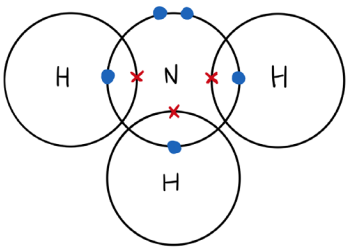
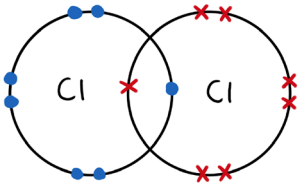


Fig 1.2 A molecule of Ammonia showing shared pairs of electrons.

Fig 1.3 A molecule of Chlorine showing shared pair of electrons.



With these diagrams, much like most things, plenty of practise is needed to be confident in them and we recommend doing plenty of these in the run up to your exams as they are one of those things that you need to keep refreshing.

Also, don't be worried about drawing perfect circles, you can if you want, but they are looking for the correct spread of electrons not perfect circles.