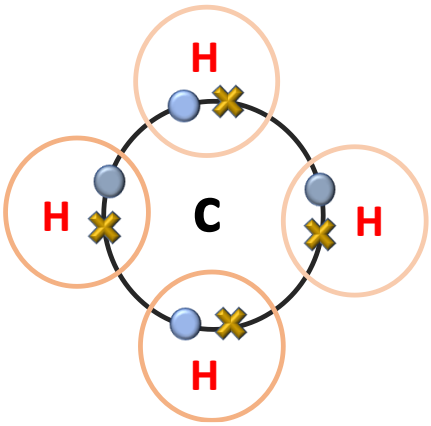
# Simple molecules and covalent bonds

**A covalent bond is formed when a pair of electrons is shared between two atoms leading to noble gas electronic configurations.**

Example:




When four hydrogen atoms covalently bond with one carbon atom, each hydrogen atom attains the electronic configuration of helium which is it's nearest noble gas. Similarly, carbon also attains the electronic configuration of neon, which is again the nearest noble gas for oxygen.

Note: A covalent bond is formed between two or more non-metals.

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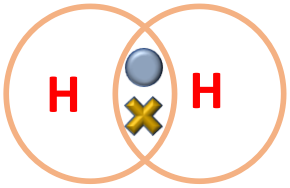
# Formation of covalent bonds using dot and cross diagrams.

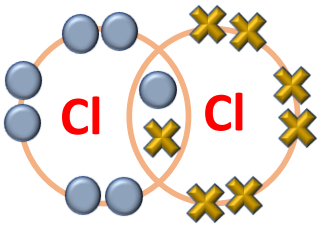
Some more examples:

[Note only the outer shells have been shown]

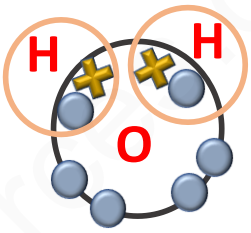
Hydrogen



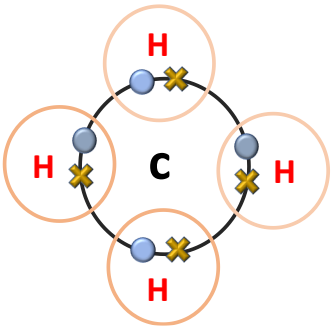

Chlorine



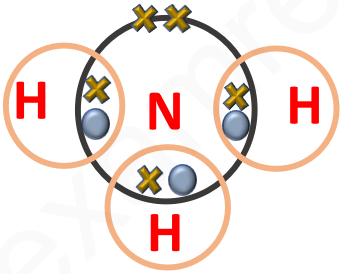

Water



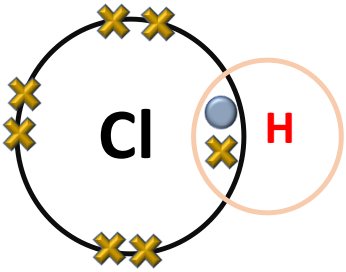

Methane




Ammonia




Hydrogen chloride gas

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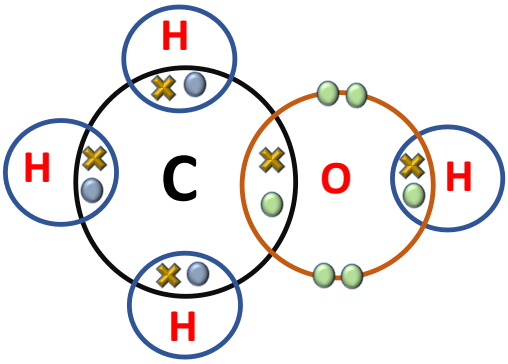
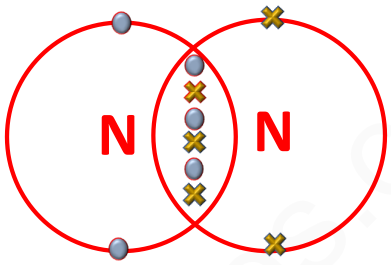
## Some more examples:

[Note only the outer shells have been shown]

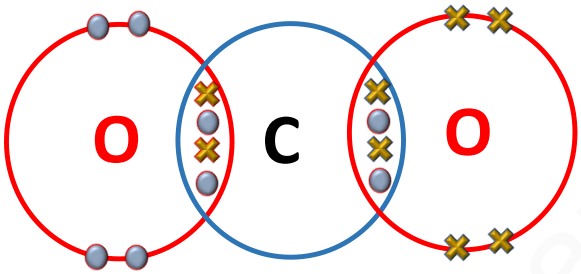
### Methanol: $CH_3OH$



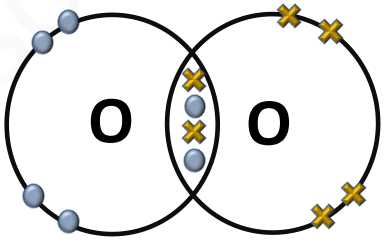

### Nitrogen:$N_2$



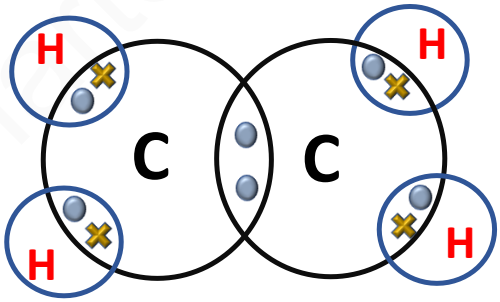

### Carbon dioxide:$CO_2$




### Oxygen: $O_2$




### Ethene:$C_2H_4$




**Note:**

- Sharing of 1 pair=Single bond formation
- Sharing of 2 pairs=Double bond formation
- Sharing pf 3 pairs=Triple bond formation

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## Properties of simple molecular compounds

- They have low melting points and boiling points because the intermolecular forces of attraction are very weak. Exceptions are $SiO_2$ with a very high melting point.
- They have poor electrical conductivity because they have no free ions. Note that HCl gas , which is a covalent compound, reacts with water to form HCl acid, which splits up into ions and then conducts electricity.

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