CAIE Chemistry IGCSE

2.5 Simple molecules and covalent bonds

Flashcards

How is a covalent bond formed?

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A covalent bond is formed when a pair of electrons is shared between two atoms resulting in both atoms having full outer electron shells (the same electron configuration as a noble gas)

Describe the formation of covalent bonds in water, H_2O

Describe the formation of covalent bonds in water, H_2O

A hydrogen atom has 1 outer electron

An oxygen atom has 6 outer electrons

So an oxygen atom shares 2 of its electrons with 2 hydrogen atoms to form water and achieve noble gas configuration.

Describe the formation of covalent bonds in NH_3

Describe the formation of covalent bonds in NH_3

A nitrogen atom has 5 outer electrons

A hydrogen atom has 1 outer electron

So a nitrogen atom shares 3 of its electrons with 3 hydrogen atoms to form NH_3 and achieve noble gas configuration

Using a dot and cross diagram, show the electron configuration of a chlorine molecule, Cl_2

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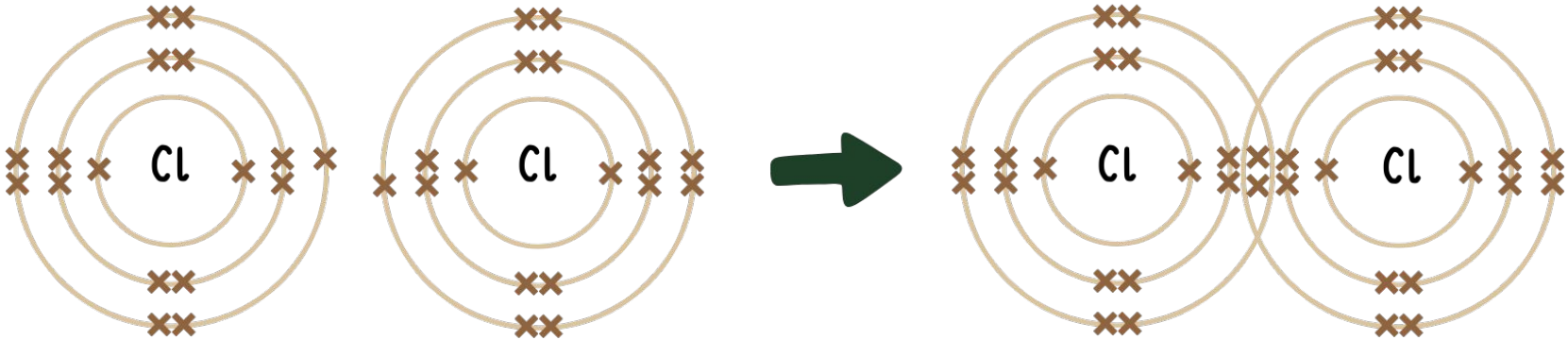

Give examples of simple molecular compounds

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Simple, small molecules, such as: HCl, NH_3, CH_4 and pure H_2O are known as simple molecular compounds

Describe the melting and boiling point of simple molecular compounds

Describe the melting and boiling points of simple molecular compounds

Simple molecular compounds have poor/low melting and boiling points

Describe the electrical conductivity of simple molecular compounds

Describe the electrical conductivity of simple molecular compounds

Poor electrical conductivity/ Cannot conduct electricity

Describe the formation of covalent bonds in CO_2 (extended only)

Describe the formation of covalent bonds in CO_2 (extended only)

A carbon atom needs 4 more electrons and each oxygen atom needs 2 more electrons to achieve noble gas configuration.
So each oxygen atom is bonded to the carbon atom with a double covalent bond (2 pairs of electrons are shared between the atoms).
Shown by the outermost shells of the atoms overlapping in dot and cross diagrams and with two lines to represent the double bonds:
O=C=O

Using a dot and cross diagram, show the electron configuration of CO_2 (extended only)

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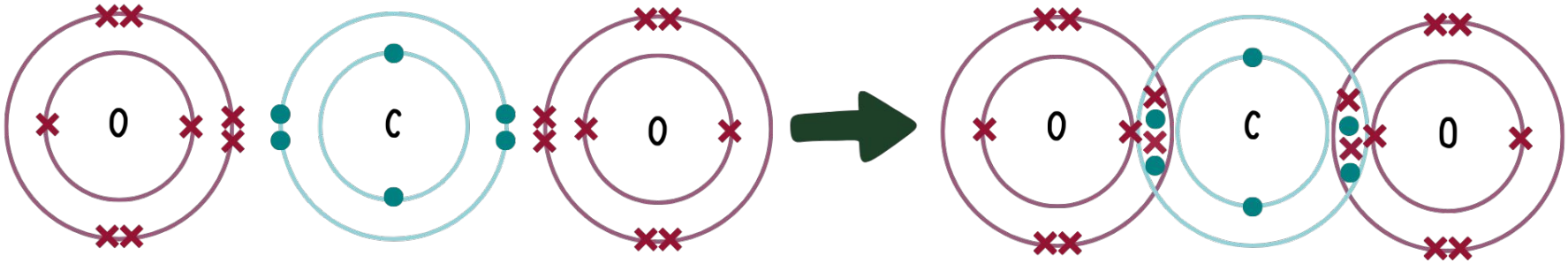


Describe the formation of covalent bonds in N_2 (extended only)

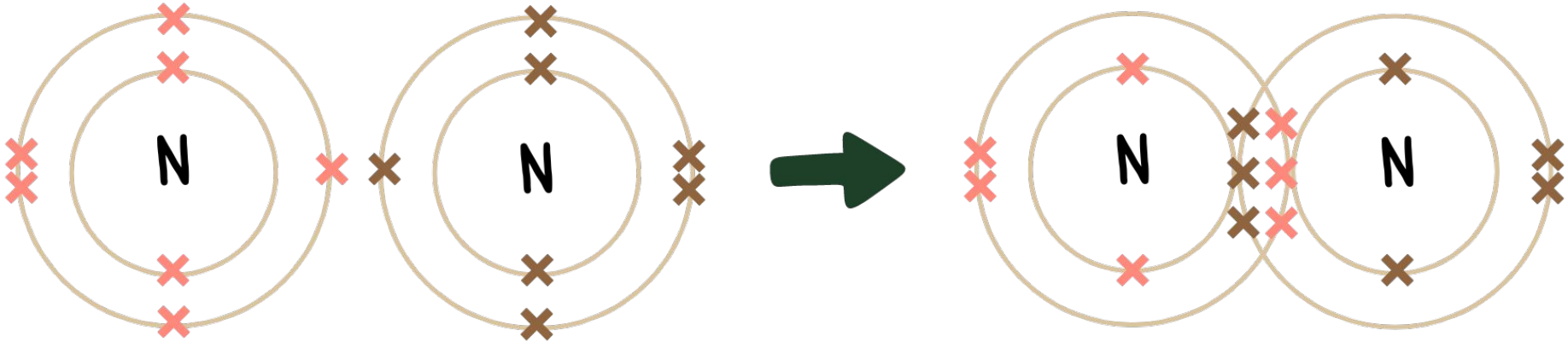
Describe the formation of covalent bonds in N_2 (extended only)

Each nitrogen atom needs 3 more electrons to achieve noble gas configuration, so each nitrogen atom is bonded to another nitrogen atom with a triple covalent bond (3 pairs of electrons are shared between the atoms).

Shown by the outermost shells of the atoms overlapping in dot and cross diagrams and with three lines to show the triple bond: N≡N

Using a dot and cross diagram, show the electron configuration of N_2 (extended only)

Using a dot and cross diagram, show the electron configuration of N_2 (extended only)



Explain why simple molecular compounds have low melting and boiling points (extended only)

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Simple molecular compounds have low melting and boiling points because the intermolecular forces between the molecules are very weak so little energy is needed to overcome them.

Explain why simple molecular compounds have poor electrical conductivity (extended only)

Explain why simple molecular compounds have poor electrical conductivity (extended only)

Simple molecular compounds have poor electrical conductivity/ cannot conduct electricity because there are no ions (charged particles) to carry any charge.