

Lewis Diagrams

These are simple effective diagrams to represent **valence electrons** in covalently bonded molecules.

- **Lewis diagrams for molecules**
 - **contain covalent bonds between non-metal atoms**
 - the attractive forces that join together two **non-metal atoms**

 - **Electrons are shared** to obtain a full outer (valence) shell of electrons = 8 electrons for all atoms except hydrogen (2)
 - single bond = 2 electrons shared
 - double bond = 4 electrons shared
 - triple bond = 6 electrons shared

 - When electrons are shared, there is greater attraction between (protons and electrons) than repulsion (between electrons and electrons or protons and protons).
 - This is why a molecule of hydrogen stays together. 4 attractions and 2 repulsions

Steps for drawing Lewis Diagrams for molecules

1. Draw the Lewis diagram for each atom
2. Unpaired electrons (bonding electrons) are available to share in a covalent bond
3. Paired electrons (lone pairs) don't participate in bonding
4. The atom with the most bonding electrons becomes the central atom and all other atoms are placed around it.
5. Count electrons around each atom. If any atom does not have all its outer shell electrons paired, then shift pairs of electrons from a non bonding space to a bonding space, making double or triple bonds until the outer shell is full.
6. If unsure whether it has been drawn correctly, add valence electrons of all atoms up and there should be that many in the Lewis diagram.
 - Each individual atom now has a full valence shell of electrons
 - Pairs of electrons not involved in bonding are called 'non-bonding' or 'lone pairs' of electrons.

- Electrons shared in a covalent bond are called bonding electron pairs
- Atoms in a molecule may share more than two electrons to achieve a full valence shell.
 - O_2 = double bond (2 pairs of bonding electrons = 4 e shared)
 - N_2 = triple bond (3 pairs of bonding electrons = 6 e shared)

Dative (coordinate) Bonding

- Covalent bonds where one atom donates both bonding electrons. An arrow is drawn to show the direction that the electrons have been donated (Donator → Acceptor)
- If central atom doesn't have octet of electrons, outer atom may provide *both* electrons to be shared between them.
- If the central atom has a lone pair of electrons, it may provide *both* electrons for the shared bond

Draw

