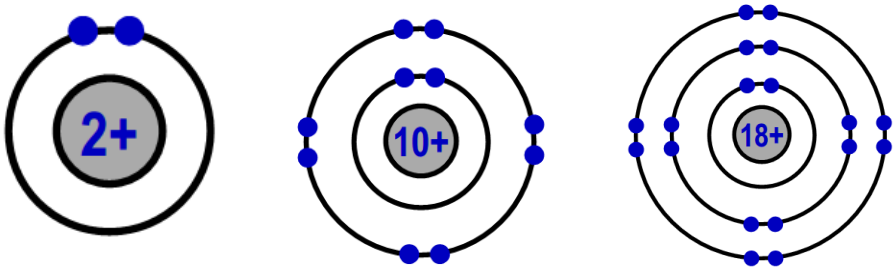
Bonding – Full Outer Shells

The outermost (electron) shell of an atom is called the valence shell. Full valence shells are particular stable. Full or empty valence are the goal!! Preferred electron configurations (arrangements) are:

He Ne Ar



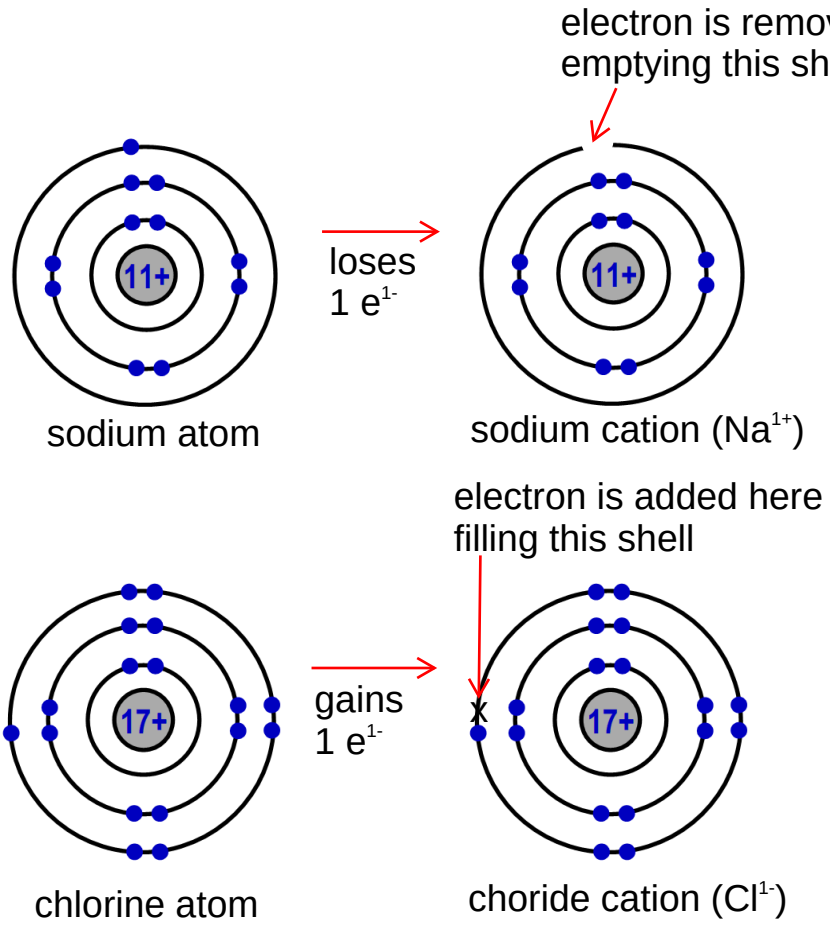
The above three atoms are full satisfied stable noble gases. Other atoms will lose or gain or share in such away as to look like these atoms.

Ionic Bonding: Loser Gainer Bonding

- a metallic atom will lose and become positive (forms a positive ion called a CATION)
- non-metal atom will gain and become negative (forms a negative ion called an ANION)

The CATION and ANION are attracted to each other and form an ionic bond.

eg



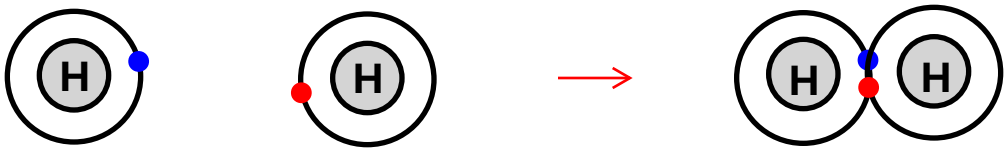
Attraction between the sodium (Na^{1+}) cation and the chloride (Cl^{1-}) anion creates the ionic bond. The compound produced is called sodium chloride and has the formula NaCl.

Ionic compound form crystals (crystal lattice structure), tend to be soluble in water and when dissolved in water, the resulting solution will be conductive of electricity.

Covalent Bonding: Bonding Through Sharing

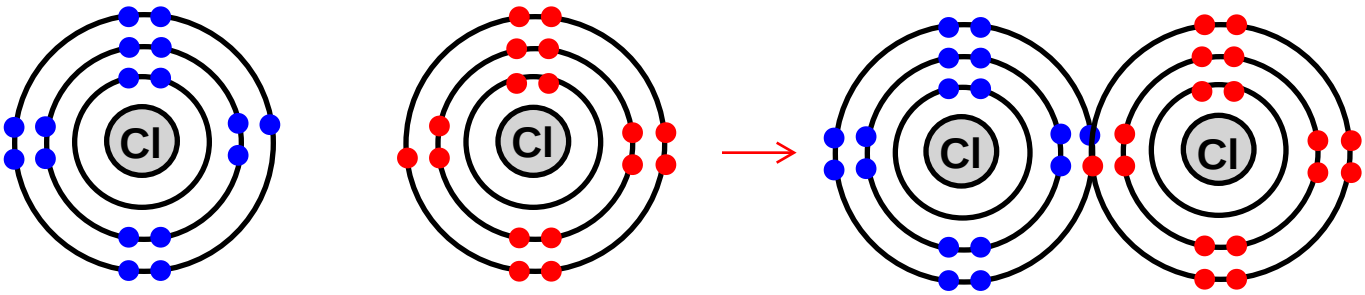
- non-metals only (includes hydrogen)
- non-metals are unwilling to lose electrons and therefore bond through sharing instead
- shared electrons act as though they belong to both atoms in the bond and make possible full outermost (valence)shells
- bonding electrons hold the atoms together through mutual attraction to atomic nuclei
- the strongest and most detailed type of bonding!!!

eg hydrogen with hydrogen



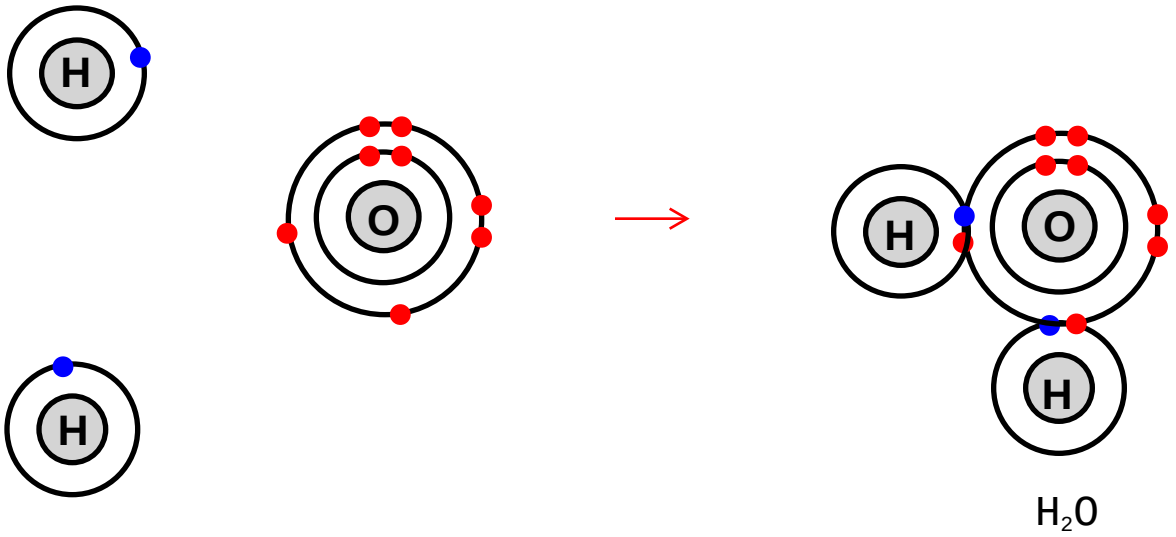
formula is H_2

eg chlorine with chlorine



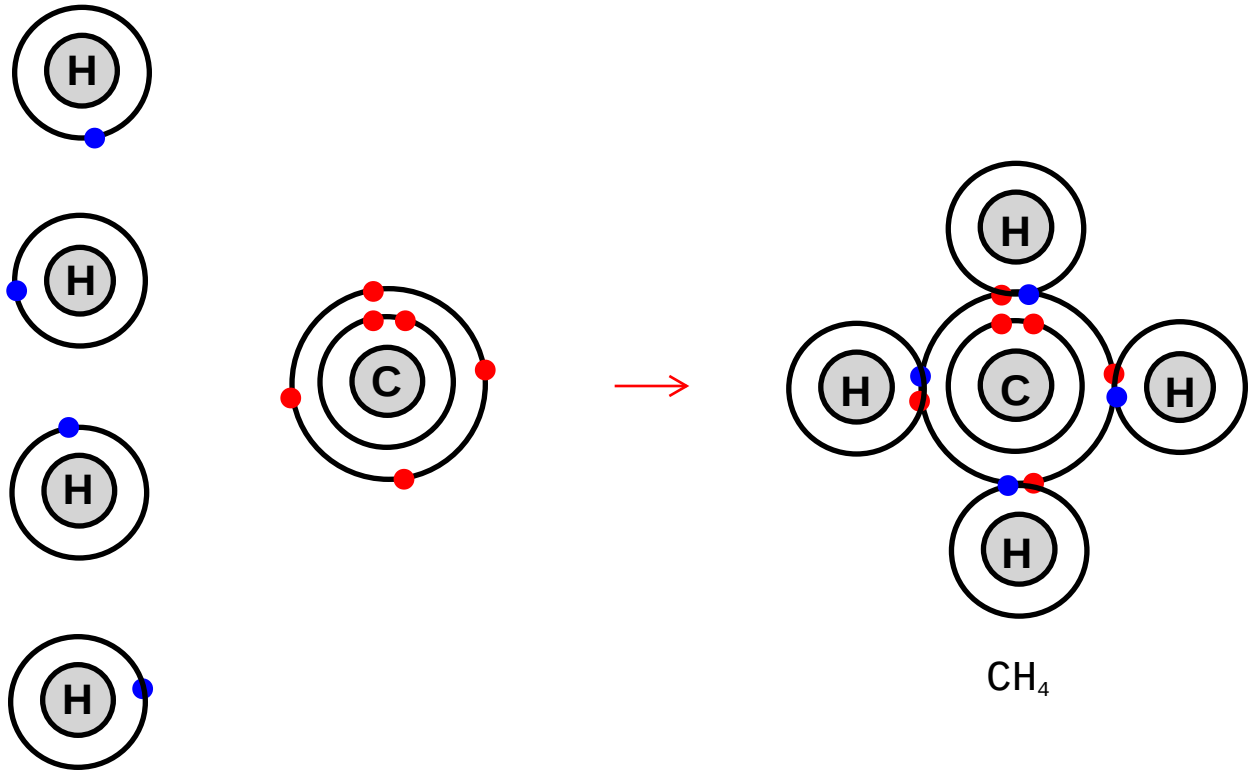
Cl_2

eg water



H_2O

eg methane



CH_4