

Ionic and Covalent Bonding Cheat Sheet by fongrsy via cheatography.com/65383/cs/17916/

Why do atoms bond?

- Atoms like Noble Gases do not combine with other atoms because they have stable electronic structures
- All other atoms bond during chemical reactions in order to have a Stable Noble Gas Configuration
- Bonding only involves the valence electrons
- Valence electrons are responsible for the chemical properties of an atom

Forming Ions

- Atoms of metals have few valence electrons (1-2) thus they tend to lose electrons to form positive ions (cations).
- Atoms of non-metals have many valence electrons (4-7) thus they tend to gain electrons to form negative ions (anions).
- In this way, they obtain the electronic configuration of a stable noble gas.

Ionic Bonding

- lonic bonding is the electrostatic forces of attraction between oppositely charged metal cations and non-metal anions.
- Ionic bonding occurs between 1 METALLIC atom and 1 or more NON-ME-TALLIC atoms.
- It involves the TRANSFER OF ELECTRONS from a metal atom to a nonmetal atom to achieve a stable noble gas configuration.
- This results in the formation of oppositely charged IONS.

Covalent Bonding

- A covalent bond occurs between 2 or more NON-METALLIC atoms.
- It involves the SHARING of one or more pair/s of electrons between the non-metallic atoms to achieve a noble gas electronic configuration. This results in the formation of MOLECULES.
- The bonds can be formed between atoms of the same elements or between atoms of different elements.

Covalent Bonding (cont)

 A COVALENT bond is the electrostatic forces of attraction between the nuclei of the 2 atoms and the pair of shared electrons.

Ionic Bonding VS Covalent Bonding

Difference	Ionic Bond	Covalent Bond
Atoms	Metal and	Non-metals only
involved	Non-metal	
Formed	Electron	Electron
by	Transfer	Sharing
Electrical	Only in	Does not
Conduc-	aqueou-	conduct
tivity	s/molten	EXCEPT for
	form	graphite
Solubility	Most are	Most are
in Water	soluble	insoluble

Dot and Cross (Ionic)

- Write down the formula of the compound and the electronic configuration of the atoms.
- Look at the valency of the atoms and determine how many need to be transferred.
- 3. The cation loses all its valence electrons while the anion gains electrons until both ions obtain a stable noble gas configuration.
- 4. Draw circles to represent the electron shells and dots/crosses to represent electrons. (Do not forget to write the element's formula in the centre of the circle.)
- 5. For the anion, use the symbol (dots or crosses) that you used for the cation to represent the number of ions transferred from the cation to the anion.
- 6. Remember to draw brackets, write the number of atoms before the brackets, and write the charge to the top right of the bracket. (e.g 3+)

Dot and Cross (Covalent)

- 1. Write down the formula of the compound and the electronic configuration of the atoms.
- 2. Look at the valency of the atoms and determine how many need to be shared.
- 3. For compounds of a single element like CI2 or N2, the number of bonds that need to be shared is the number of electrons it needs to become stable. (E.g for N2, it has 5 valence electrons and needs 3 more to become stable, therefore it has 3 pairs of shared electrons.)
- 4. For compounds made of multiple elements, determine how many bonds are required for all elements to become stable. Note that 1 pair of shared electrons = 1 more electron for the atom.
- 5. Draw circles to represent the valence electron shells and dots/crosses to represent the valence electrons. Note that the circles have to intersect so there is space to draw shared pairs of electrons.
- 6. Draw the valence electrons on the circles and the shared pairs of electrons in the intersection
- 1 pair of shared electrons = 1 more electron for the individual atom



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