

Bonding Foldable:

First, fold your paper
in half like this.



Not this.



You need three "flaps."

To cut
"flaps," cut
only the top
half of the
folded paper.



**Do not write
these numbers
on your flaps!**

Ionic Bond

Covalent Bond

Metallic Bond

**Label
your
flaps!**

Ionic Bond – A bond (or force) that attracts electrons from one atom to another, which transforms a neutral atom to an ion.

Electrons in an ionic bond are transferred (**lost by cations** or **gained by anions**) when the bond forms.

Ionic Bond Properties

- A metal & a nonmetal bonded together forms ionic compound
- Metals lose electron(s), nonmetals gain electron(s)
- Forms a repeating ionic crystal (crystal lattice)
- Ionic compounds have high melting points
- An ionic compound's formula is called a **Formula Unit**
- Ionic compounds generally conduct electricity when dissolved in solution.
- Examples: NaCl, MgBr, Sr₃N₂, KCl

Sodium and calcium form an ionic bond when sodium gives its 1 valence electron to chlorine

Covalent Bond – A bond is formed when atoms **share** one or more pairs of electrons.

Electrons in a covalent bond are shared when the bond forms. Both atoms get the octet.

Covalent Bond Properties

- Covalent bonds form between nonmetals and other nonmetals.
- Electrons are shared to fill the octet (or duet, for H & He).
- Can share multiple pairs of electrons (double or triple bonds)
- Low melting points.
- Called a molecular compound or molecule.
- Examples: H₂O, H₂O₂, CH₄

Two H atoms each share their 1 electron with an O atom. H fills outer shell with 2 (duet rule) and O fills outer shell with 8 (octet)

Metallic Bond – A bond (or force of attraction) formed by the attraction between positively charged metal ions and the electrons around them.

Electrons in a metallic bond are *delocalized*, meaning they no longer stay with their nucleus, but move freely around all the atoms. This is also called the "sea of electrons."

Sea of electrons

Metallic Bond Properties

- ▶ Occurs when many atoms of one type of element. (does not bond 2 or more metals.)
- ▶ Electrons are free to move in the "sea of electrons" and do not belong to one individual atom.
- ▶ Because of sea of electrons, metal atoms have high electrical and thermal conductivity.
- ▶ Strong absorbers and reflectors of light.
- ▶ Have luster, are malleable & ductile
- ▶ Examples: Fe, Mg