



# Properties of Ionic & Molecular Bonds

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Video Workbook with Dr. B

Metal + Non-Metal = *Ionic*

We use ionic charge with ionic compounds!

Non-Metal + Non-Metal = *Molecular*

We **do not** use ionic charge with molecular compounds!

1 H Hydrogen																	2 He Helium						
3 Li Lithium	4 Be Beryllium	Metals										Metalloids			Non-Metals								
11 Na Sodium	12 Mg Magnesium	Transition Metals																13 Al Aluminum	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon
19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton						
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon						
55 Cs Cesium	56 Ba Barium	57 La Lanthanum	72 Hf Hafnium	73 Ta Tantalum	74 W Tungsten	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum	79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon						
87 Fr Francium	88 Ra Radium	89 Ac Actinium	104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium	110	111	112	113	114										

The atoms in Ionic compounds **transfer** electrons.

The atoms in Molecular (also called Covalent) compounds **share** electrons.

This results in them having different properties (in general).

## Key Terms

A **chemical bond** forms when valence electrons are transferred (ionic) or shared (molecular) between atoms.

Bonds are formed to fill their highest energy level (often called an **Octet**). Noble gases have octets.

**Ionic Bond**—a strong bond between a metal cation (positive ions) and non-metal anion (negative ions)

**Ion**—atoms that have a charge (+ or -).

Lost electron = + charge = cation.

Gained electron = - charge = anion.

**Molecular (Covalent) Bond**—a semi-strong bond between two non-metals.

For example:

Which compound would share electrons:  $\text{CaCl}_2$  or  $\text{SO}_2$ ?

Which compound would be ionic:  $\text{NaCl}$  or  $\text{CuCl}_2$ ?

Which would have a stronger bond:  $\text{MgO}$  or  $\text{CH}_4$ ?

Answers:  $\text{SO}_2$  is molecular so it would share electrons. Both  $\text{NaCl}$  and  $\text{CuCl}_2$  are ionic compounds.  $\text{MgO}$  is ionic so it would have a strong bond.



## Properties of Ionic and Molecular Compounds

Property	Ionic Bonds	Covalent Bonds
<i>State</i>	crystalline solids	solids, liquids, gases
<i>Melt/Boiling Point</i>	High	Low
<i>Solubility</i>	Usually dissolves in water but not in non-polar liquids	Usually soluble in non-polar liquids but not in water
<i>Conductivity</i>	Conducts electricity when melted or dissolved in water.	Does not conduct electricity.
<i>Hardness</i>	Hard and brittle	For covalent solids - usually soft

[Quiz](#) (answers provided at end of quiz, you can retake this quiz multiple times).

Report errors and suggestions to [DrB@breslyn.org](mailto:DrB@breslyn.org)



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