



Ionic and Covalent Bonding

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What is a Chemical Bond?

A **chemical bond** is formed when the nucleus of one atom pulls on the electrons of another.

The bond is formed by **transferring** or **sharing electrons**. We are going to talk about 2 types of bonds: Ionic and Covalent.

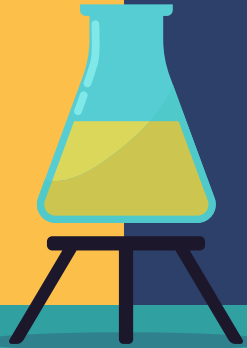
The type of bond is determined by **electronegativity difference**.

Electronegativity Difference

Electronegativity describes the degree to which the atom **attracts electrons** in a chemical bond.

If the electronegativity difference is 2 or more, then the bond is **IONIC**.

If the electronegativity difference is less than 2, then the bond is **COVALENT**.



How to find electronegativity difference

To find the electronegativity of two atoms, simply **look up their electronegativity value.**

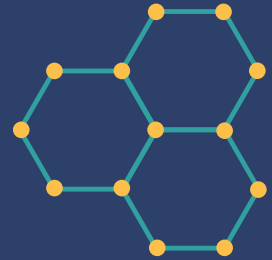
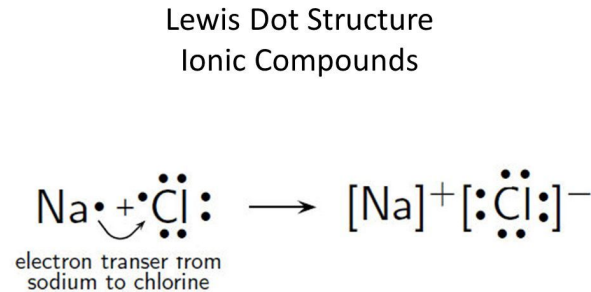
For example, “Helium Electronegativity”, “Fluorine Electronegativity”, etc.

Once you find out the electronegativity values of both atoms, **subtract them.**

Ionic Bonding

Ionic bonding is the TRANSFER of valence electrons between atoms. It is formed when a **METAL** transfers one or more valence electrons to a **NONMETAL**. In ionic bonding, you want the atoms to have an electron number of either 0 or 8. Lewis electron dot structures show what happens to the valence electrons.

Losing an electron is a **positive charge** and **gaining** an electron is a **negative charge**. In the example, Na becomes a positive charge for losing an electron and Cl becomes a negative charge for gaining an electron.



Properties of Ionic Substances

Ionic substances have a number of properties that can help distinguish them from other substances.

They are:

- **hard**
- **good conductors** of heat and electricity in their liquid form
- **high melting** and **boiling points**

Properties of Covalent Compounds

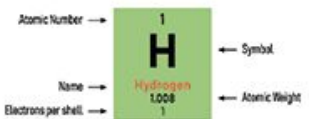
When a covalent compound is made, it gains new properties because it is a new substance.

They are:

- **soft**
- **low melting/boiling points**
- **poor conductors** of heat and electricity.

Periodic Table of the Elements

1 IA H Hydrogen 1.008 1																	18 VIIIA He Helium 4.0026 2	
3 Li Lithium 6.94 3	4 IIA Be Beryllium 9.009 4																	10 Ne Neon 20.180 10
11 Na Sodium 22.990 11	12 Mg Magnesium 24.305 12																	18 Ar Argon 39.948 18
19 K Potassium 39.098 19	20 Ca Calcium 40.078 20	21 Sc Scandium 44.956 21	22 Ti Titanium 47.88 22	23 V Vanadium 50.942 23	24 Cr Chromium 51.996 24	25 Mn Manganese 54.938 25	26 Fe Iron 55.845 26	27 Co Cobalt 58.933 27	28 Ni Nickel 58.693 28	29 Cu Copper 63.546 29	30 Zn Zinc 65.38 30	31 Ga Gallium 69.723 31	32 Ge Germanium 72.631 32	33 As Arsenic 74.922 33	34 Se Selenium 78.971 34	35 Br Bromine 79.904 35	36 Kr Krypton 83.798 36	
37 Rb Rubidium 85.468 37	38 Sr Strontium 87.62 38	39 Y Yttrium 88.906 39	40 Zr Zirconium 91.224 40	41 Nb Niobium 92.906 41	42 Mo Molybdenum 95.94 42	43 Tc Technetium 98 43	44 Ru Ruthenium 101.07 44	45 Rh Rhodium 102.91 45	46 Pd Palladium 106.42 46	47 Ag Silver 107.87 47	48 Cd Cadmium 112.41 48	49 In Indium 114.82 49	50 Sn Tin 118.71 50	51 Sb Antimony 121.76 51	52 Te Tellurium 127.60 52	53 I Iodine 126.91 53	54 Xe Xenon 131.29 54	
55 Cs Cesium 132.905 55	56 Ba Barium 137.33 56	57-71 Lanthanides	72 Hf Hafnium 178.49 72	73 Ta Tantalum 180.948 73	74 W Tungsten 183.84 74	75 Re Rhenium 186.21 75	76 Os Osmium 190.23 76	77 Ir Iridium 192.22 77	78 Pt Platinum 195.08 78	79 Au Gold 196.967 79	80 Hg Mercury 200.59 80	81 Tl Thallium 204.38 81	82 Pb Lead 207.2 82	83 Bi Bismuth 208.98 83	84 Po Polonium 209 84	85 At Astatine 210 85	86 Rn Radon 222 86	
87 Fr Francium 223 87	88 Ra Radium 226 88	89-103 Actinides	104 Rf Rutherfordium 261 104	105 Db Dubnium 262 105	106 Sg Seaborgium 263 106	107 Bh Bohrium 264 107	108 Hs Hassium 265 108	109 Mt Meitnerium 266 109	110 Ds Darmstadtium 267 110	111 Rg Roentgenium 268 111	112 Cn Copernicium 269 112	113 Nh Nihonium 270 113	114 Fl Flerovium 271 114	115 Mc Moscovium 272 115	116 Lv Livermorium 273 116	117 Ts Tennessine 274 117	118 Og Oganesson 274 118	



State of matter (color of name)
 GAS LIQUID SOLID UNKNOWN

Subcategory in the metal-metalloid-nonmetal trend (color of background)
 Alkali metals Lanthanides Metalloids
 Alkaline earth metals Actinides Reactive nonmetals
 Transition metals Post-transition metals Noble gases
 Unknown chemical properties

57 La Lanthanum 138.91 57	58 Ce Cerium 140.12 58	59 Pr Praseodymium 140.91 59	60 Nd Neodymium 144.24 60	61 Pm Promethium 145 61	62 Sm Samarium 150.36 62	63 Eu Europium 151.96 63	64 Gd Gadolinium 157.25 64	65 Tb Terbium 158.93 65	66 Dy Dysprosium 162.50 66	67 Ho Holmium 164.93 67	68 Er Erbium 167.26 68	69 Tm Thulium 168.93 69	70 Yb Ytterbium 173.05 70	71 Lu Lutetium 174.97 71
89 Ac Actinium 227 89	90 Th Thorium 232.04 90	91 Pa Protactinium 231.04 91	92 U Uranium 238.03 92	93 Np Neptunium 237 93	94 Pu Plutonium 244 94	95 Am Americium 243 95	96 Cm Curium 247 96	97 Bk Berkelium 247 97	98 Cf Californium 251 98	99 Es Einsteinium 252 99	100 Fm Fermium 257 100	101 Md Mendelevium 258 101	102 No Nobelium 259 102	103 Lr Lawrencium 260 103

Here is a link to a more detailed periodic table:

<https://www.webelements.com/>

THANKS

Does anyone have any questions?



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