

Success 24/7 Chemistry: Ionic and Metallic Bonding

Ionic Bonds:

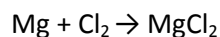
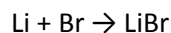
An electrostatic attraction between a cation and anion.

A bond between a metal and a nonmetal.

Electrons are transferred. (The metal will lose electrons and the nonmetal will gain electrons.)

hydrogen 1 H 1.008	beryllium 4 Be 9.012																	helium 2 He 4.002																																											
lithium 3 Li 6.941	boron 5 B 10.811	carbon 6 C 12.011	nitrogen 7 N 14.007	oxygen 8 O 15.999	fluorine 9 F 18.998	neon 10 Ne 20.180																	argon 18 Ar 39.948																																						
sodium 11 Na 22.990	magnesium 12 Mg 24.305	aluminum 13 Al 26.982	silicon 14 Si 28.086	phosphorus 15 P 30.974	sulfur 16 S 32.065	chlorine 17 Cl 35.453	argon 18 Ar 39.948	potassium 19 K 39.098	calcium 20 Ca 40.078	scandium 21 Sc 44.956	titanium 22 Ti 47.887	vanadium 23 V 50.942	chromium 24 Cr 51.996	manganese 25 Mn 54.938	iron 26 Fe 55.845	cobalt 27 Co 58.933	nickel 28 Ni 58.693	copper 29 Cu 63.546	zinc 30 Zn 65.38	gallium 31 Ga 69.723	germanium 32 Ge 72.61	arsenic 33 As 74.922	selecnium 34 Se 78.96	bromine 35 Br 79.904	krypton 36 Kr 83.80																																				
rubidium 37 Rb 85.468	strontium 38 Sr 87.62	yttrium 39 Y 88.906	zirconium 40 Zr 91.224	niobium 41 Nb 92.906	molybdenum 42 Mo 95.94	technetium 43 Tc [98]	ruthenium 44 Ru 101.07	rhodium 45 Rh 101.07	paladium 46 Pd 106.42	silver 47 Ag 107.87	cadmium 48 Cd 112.41	indium 49 In 114.82	tin 50 Sn 118.71	antimony 51 Sb 121.76	tellurium 52 Te 127.60	iodine 53 I 126.90	xenon 54 Xe 131.29	cesium 55 Cs 132.91	barium 56 Ba 137.33	lanthanum 57-70 Lu 138.905	hafnium 71 Hf 178.49	tantalum 72 Ta 180.95	wolfram 73 W 183.84	reynoldsium 74 Re 186.21	osmium 75 Os 190.23	iridium 76 Ir 192.22	platinum 77 Pt 195.08	gold 78 Au 196.97	mercury 79 Hg 200.59	thallium 80 Tl 204.38	lead 81 Pb 207.2	bismuth 82 Bi 208.98	polonium 83 Po [209]	astatine 84 At [210]	radon 85 Rn [222]	actinium 87-102 Fr [223]	thorium 88 Th [232]	protactinium 89-102 Pa [231]	uranium 92 U [238]	neptunium 93 Np [237]	plutonium 94 Pu [244]	americium 95 Am [243]	curium 96 Cm [247]	berkelium 97 Bk [247]	californium 98 Cf [251]	einsteinium 99 Es [252]	fermium 100 Fm [257]	mendelevium 101 Md [258]	nobelium 102 No [259]	lawrencium 103 Lr [260]	rutherfordium 104 Rf [261]	dubnium 105 Db [262]	seaborgium 106 Sg [263]	bohrium 107 Bh [264]	hassium 108 Hs [265]	meitnerium 109 Mt [266]	darmstadtium 110 Ds [271]	roentgenium 111 Rg [272]	copernicium 112 Cn [285]	unbinilium 113 Uub [284]	ununilium 114 Uuq [289]

Lewis Structures for Ionic Bonds:



Ionic compound need to know:

High melting points. (many higher than 800°C)

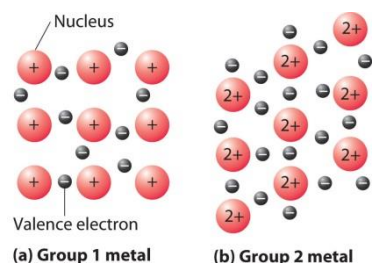
Solid at room temperature.

Metallic Bonds:

Consist of the attraction of free-floating valence electrons for the positively charged metal ions.

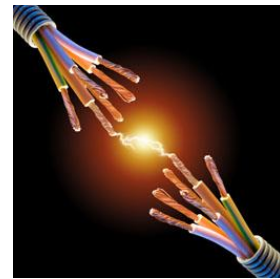
Metallic solids consist of positively charged metal cation nuclei in a “sea” of loosely held valence electrons.

This arrangement allows metals to have their unique properties.



Properties of Metallic Bonds:

- Ductility- metals can be pulled into a wire
- Malleability- metals can be hammered into a thin sheet because the valence electrons act as “grease”, allowing the cations to slide past each other without colliding with each other and shattering.
- Conductivity- metals can conduct heat and electricity easily. Electricity is a flow of electrons. As electricity (electrons) enters one end of a piece of metal, an equal number of electrons exit the other end.



Alloys: A mixture that contains at least 2 different metals.

Most important alloy today is steel.

	Silver (Ag)	Gold (Au)	Palladium (Pd)	Copper (Cu)	Zinc (Zn)
Fine Silver	100%				
Sterling Silver	92.50%			7.50%	
Coin Silver	80%			20%	
10k Yellow Gold	12%	42%		41%	5%
10k White Gold		42%	58%		
14k Yellow Gold	25%	58%		17%	
14k White Gold		58%	42%		
18k Yellow Gold	12.50%	75%		12.50%	
18k White Gold		75%	25%		
22k Yellow Gold	4%	92%		4%	
24K Gold		100%			