

Properties of Matter

The Periodic Table

H												noble gases					He	
Li	Be	metals										non-metals					semi-metals	He
Na	Mg											B	C	N	O	F	Ne	
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	
Cs	Ba	*	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	**	Lr	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg							
* lanthanoids		La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb			
** actinoids		Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No			

The **metals** are all those elements to the left of the step. The **non-metals** are all those to the right. Note that there are many more metals than non-metals. B, Si, Ge, As and Te are technically **semi-metals**. They occur between the metals and non-metals. Here are the properties of metals and non-metals, in general.


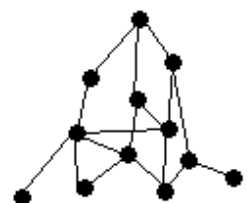
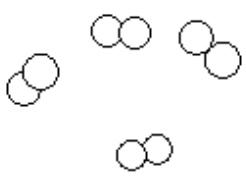
Properties of Metals and Non-metals

Metals
<ul style="list-style-type: none"> • Good conductors of electricity and heat • Malleable - can be hammered into shapes • Ductile - can be drawn into wires • Lustre - metals are often shiny and bright • High melting and boiling points - solids

Non-metals
<ul style="list-style-type: none"> • Poor conductors of electricity and heat • Brittle - tend to break when bending them • Lustre - dull and powdery, variety of lustre • Low melting and boiling points: gases

The Structure of Elements

Non-metals are generally composed of separate, individual molecules, usually containing two atoms. **Metals** join together in large groups. Metal atoms join together because their electrons are usually not strongly held. **Semi-metals** tend to bond in a complex but symmetrical way, in a network structure.

Metals	Semi-metals	Non-metals
Metallic network <i>Example: Sodium</i>	Covalent network <i>Example: Silicon</i>	Discrete molecules <i>Example: Chlorine</i>
		
Electrons free to move through lattice	Each atom bonded to four others around it	Composed of individual molecules