#### **Periodic Table**

Periods in the periodic table. In each period (horizontal row), the atomic numbers increase from left to right. The periods are numbered 1 through 7 on the left-hand side of the table. Elements that are in the same period have chemical properties that are not all that similar.

# Atomic Structure

Ne 2,8 Electrons in shells. Electrons in atoms occupy energy levels, also called electron shells, outside the nucleus . Different shells can hold different maximum numbers of electrons. The electrons in an atom occupy the lowest available energy level first

# metals are to the left of the red line

non-metals are on the right

#### Metals

- normally good conductors of heat and electricity
- shiny when cut
- malleable
- dense and sonorous
- most have high melting points

# Group 1

- called the alkali metals
- like all other metals but are very reactive
- react vigorously (strongly) with water
  get more reactive as you go down the group
- lower melting points than most other metals
- melting points decrease down
   the group
- always produce a metal hydroxide and hydrogen gas when reacted with water

# Mendeleev

Mendeleev left gaps in his table for elements not known at the time. By looking at the properties of the elements next to a gap, he could also predict the properties of these undiscovered elements. For example, Mendeleev predicted the existence of 'eka-silicon', which would fit into a gap below silicon. Another scientist later discovered the missing element, germanium. Its properties were found to be similar to the predicted ones and confirmed Mendeleev's periodic table.

#### Trends in the atomic structure

# Elements are arranged by proton number

The group number is the same as the number of electrons in the outer shell of the atoms of that element.

The period number is the same as the number of shells that the atoms have that contain electrons.

	H hydrogen																He helium
Li lithium	Be beryllium						B	C carbon	N nitrogen	O axygen	F fluorine	Ne					
Na	Mg magnesium						AI aluminum	Si silicon	P phosphorus	S sulfur	CI chlorine	Ar argon					
K potassium	Ca calcium	Sc scandium	Ti titanium	V vanadium	Cr chromium	Mn manganese	Fe	CO cobalt	Ni nickel	Cu	Zn	Ga	Ge <sub>germanium</sub>	As arsenic	Se selenium	Br bromine	Kr krypton
Rb rubidium	Sr strontium	Y yttrium	Zr zirconium	Nb niobium	Mo molybdenum	Tc technetium	Ru ruthenium	Rh rhodium	Pd palladium	Ag	Cd cadmium	In indium	Sn tin	Sb antimony	Te tellurium	 iodine	Xe xenon
Cs caesium	Ba	La Ianthanum	Hf hafnium	Ta tantalum	W tungsten	Re rhenium	Os osmium	lr iridium	Pt platinum	Au gold	Hg	TI thallium	Pb lead	Bi bismuth	Po polonium	At astatine	Rn radon
Fr francium	Ra		metals non-metals														
	solids liquids gases at room temprature																

#### • columns are called groups

• rows are called periods

**Properties of Metals** 

Good conductor of

Good conductor of heat

electricity

High density

Malleable

Ductile

Shiny

**Properties of a typical** 

metal (when solid)

Elements in a group normally have similar properties, meaning chemists can predict properties of elements based on their group.

Properties of a typical non-

metal (when solid)

Poor conductor of

Poor conductor of heat

electricity

Low density

Dull

Brittle

Brittle

#### Non-metals

- often have properties the opposite of metals
- low boiling points, so are gases at room temperature
- · poor conductors of electricity and heat
- dull in appearance
- low density
- brittle and not sonorous

# Group 0

- called the noble gases
- very unreactive
- low boiling points, so are gases at room temperature
- like the halogens, their boiling points increase down the group

 take part in displacement reactions, where an element from higher up the group takes the place of one from lower down the group in a compound.

Group 7

For example: potassium iodide + chlorine → potassium chloride + iodine

melting point increases down the group while reactivity decreases.

· called the halogens

generally very reactive

generally the opposite of Group 1