

Building an Atom Model and Names and Formulas for Compounds

Models

Dalton's atomic model

1. All matter is made of atoms, which are particles too small to see.
2. Each element has its own kind of atom, with its own particular mass.
3. Compounds are created when atoms of different elements link to form molecules.
4. Atoms cannot be created, destroyed, or subdivided in chemical changes.

Michael Faradays 'ions'

1. Matter must contain positive and negative charges.
2. Opposite charges attract and like charges repel.
3. Atoms combine to form molecules because of electrical attractions between atoms.

J.J. Thompson revision

Atoms contain particles called electrons.

Electrons have a small mass and a negative charge.

The rest of the atom is a sphere of positive charge.

The electrons are embedded in this sphere, so that the resulting atoms are neutral or uncharged.

Ernest Rutherford - Nuclear Model

1. An atom has a tiny, dense, positive core called the nucleus (which deflected the alpha particles and contains protons).
2. The nucleus is surrounded mostly by empty space, containing rapidly moving negative electrons (through which the alpha particles passed unhindered).

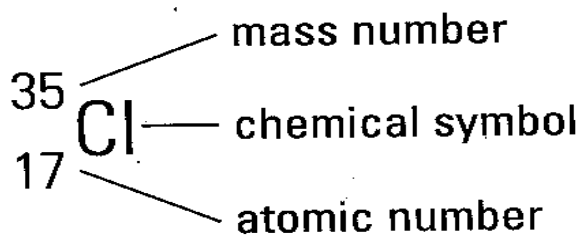
Types of Subatomic Particles

The "pieces" of an atom-the particles of which an atom is composed-are called **subatomic particles**.

Electrons, protons and neutrons are subatomic particles.

Experiments conducted by the English scientist James Chadwick, in 1932, led to the discovery of a third subatomic particle with no charge: the neutron.

These subatomic particles are described in terms of their mass relative to each other, their electrical charge, and their location.



- **Protons** are positively charged particles with a relative mass of 1, located in the nucleus.
- **Neutrons** are neutral particles with a relative mass of 1, also located in the nucleus.
- **Electrons** are negatively charged particles with a relative mass of approximately 1/2000 of the mass of a proton or neutron.

Protons are especially significant, because the number of protons in an atom determines what the atom is.

For example, any atom with one proton is a hydrogen atom (H), and any atom whose nucleus contains 12 protons is magnesium (Mg).

How Elements Combine

Rule 1	Metals combine with non-metals in many compounds
Rule 2	Write the name of the metal first and the non-metal second.
Rule 3	Change the ending of the non-metal to 'ide'
Rule 4	Each atom has its own combining capacity
Rule 5	Atoms combine so that each can fill its combining capacity

Metal, Nonmetals, Metalloids

	1 IA																	18 VIIIA																																
1	H												13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	He	1																															
2	Li	Be											B	C	N	O	F	Ne	2																															
3	Na	Mg	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	VIII			8	9	10	11 IB	12 IIB	Al	Si	P	S	Cl	Ar	3																												
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	4																															
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	5																															
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6	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	6																																			
7	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr	7																																			

 Metals

 Nonmetals

 Metalloids

Combining Capacities of Some Metals

Element	Symbol	Combining Capacity
Aluminum	Al	3
Barium	Ba	2
Calcium	Ca	2
Magnesium	Mg	2
Potassium	K	1
Silver	Ag	1
Sodium	Na	1
Zinc	Zn	2

7.1

Combining Capacities of Some Non-metals

Element	Symbol	Combining Capacity	Combined Name
Bromine	Br	1	Bromide
Chlorine	Cl	1	Chloride
Flourine	F	1	Flouride
Iodine	I	1	Iodide
Oxygen	O	2	Oxide
Sulphur	S	2	Sulphide

Combining capacity is similar to the number of connections that an atom can make.

Metals, Non-metals and Metalloids

Family 1	Alkali Metals	Li, Na, K, Rb, Cs, Fr
Family 2	Alkali Earth Metals	Be, Mg, Ca, Sr, Ba, Ra
Family 18	Noble Gases (Inert Gases)	He, Ne, Ar, Kr, Xe, Rn
Family 17	Halogens (non-metals)	F, Cl, Br, I.
	Metalloids	B, Si, Ge, As, As, Sb, Te, Po, At