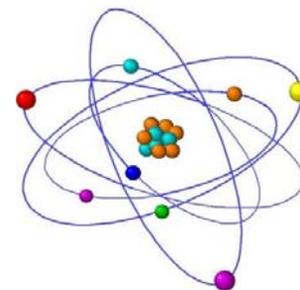


ATOMIC THEORY

REVISED 26 August 2016, Campbell 7th, pp 32-45, Sadava 8th: 20-31, Campbell 9th: 30 - 45, 10th: 28-42



[Have Periodic Chart available]

Atomic model:

Democritus (460-370 BC): matter is particulate: not infinitely divisible, **atoms** last *uncut* bit

Element definition: substance cannot be further broken down by chemical means

Bohr model specified nuclear versus orbital components, **table of subatomic particles**

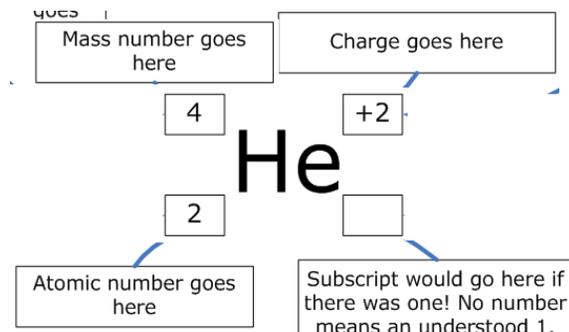
(LEARN) (p 30, 31)

subatomic particle		symbol	atomic mass	charge
orbital particle	electron	e ⁻	1/1860 amu	-1
nuclear particles	proton	P	1 amu	+1
	neutron	N	1 amu	0

net charge in elemental state = 0 (#e = #P)

atomic number = number of **protons** (defines chemical nature)

atomic mass = sum of N + P (determines isotope of given element)
(N stabilizes P in nucleus: "packing material")



LEARN the conventions of atomic symbols ↑↓

isotopes same element: different number of neutrons (Note H and/or C isotopes), nuclear reactions: p 31

radioactivity, ²H = deuterium, ³H = tritium (½ life 12.32 yr), ¹⁴C (or C-14, ½ life 5730 yr, graph: p 33)

Periodic chart on page 34 (Mendeleev figured it out: repeating traits of "Groups" with given # e in outer shell)

LEARN all these symbols: **Biological:** C, H, N, O, P, S (p. 32) (six most common elements in organisms)

Other: Na, Mg, K, Ca, Fe, Cu, Zn, (trace minerals), He, Pb

Halogens: F, Cl, Br, I

chemical activity: elements adjust electronic content so that outer shell is complete = formation of compounds

compounds: Dalton discovered that elements react in fixed ratios (to satisfy electron configuration)

Octet Rule: Elements "strive" for complete outer shell of electrons, usually eight (LEARN)

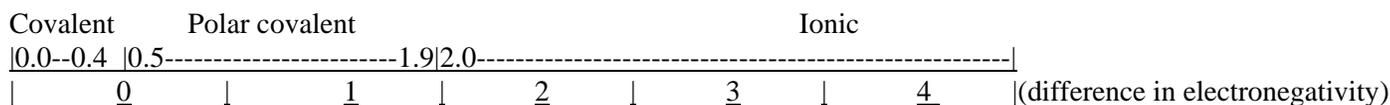
valence shell: outer shell, in the elemental form, gives "power" to element, defines chemical traits

electronegativity: affinity for electrons in elemental state (LEARN) (higher to right and top) (p. 27)

H: 2.1							He
Li: 1.0			C: 2.5	N: 3.0	O: 3.5	F: 4.0	Ne
Na: 0.9	Mg: 1.2	Al: 1.5	Si: 1.7	P: 2.0	S: 2.4	Cl: 3.0	Ar

K: 0.8, Rb: 0.8, Cs: 0.7

Difference in electronegativity between two atoms determines strength and nature of bonds (LEARN):



Oxidation: removal of electrons (or H atoms in organic chem)

Reduction: addition of electrons, chemical reaction: Na + Cl (p 38)

Chem Rxns lead to bonds: **ionic (38) and covalent (37).**

Bonds: p 39

strengths of bonds

molecular weight

