

Periodic Table of the Elements

name
atomic #
symbol
atomic mass

Hydrogen
 $\frac{1}{1.01}$

1+																				0											
1e																				8e											
1																				3+		4+/-		3-		2-		1-		2	
Hydrogen 1 H 1.01																				3e		4e		5e		6e		7e		4.00	
2		Lithium 3 Li 6.94		Boron 5 B 10.81		Carbon 6 C 12.01		Nitrogen 7 N 14.01		Oxygen 8 O 16.00		Fluorine 9 F 19.00		Neon 10 Ne 20.18		3		4		5		6		7		8					
3		Sodium 11 Na 22.99		Aluminum 13 Al 26.98		Silicon 14 Si 28.09		Phosphorous 15 P 30.97		Sulfur 16 S 32.07		Chlorine 17 Cl 35.45		Argon 18 Ar 39.95		3		4		5		6		7		8					
4		Potassium 19 K 39.10		Gallium 31 Ga 69.72		Germanium 32 Ge 72.61		Arsenic 33 As 74.92		Selenium 34 Se 78.96		Bromine 35 Br 79.90		Krypton 36 Kr 83.80		4		5		6		7		8		9					
5		Rubidium 37 Rb 85.47		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		5		6		7		8		9		10					
6		Cesium 55 Cs 132.91		Thallium 81 Tl 204.38		Lead 82 Pb 207.20		Bismuth 83 Bi 208.98		Polonium 84 Po [209]		Astatine 85 At [210]		Radon 86 Rn [222]		6		7		8		9		10		11					
7		Francium 87 Fr [223]		Nihonium 113 Nh [284]		Flerovium 114 Fl [289]		Moscovium 115 Mc [288]		Livermorium 116 Lv [293]		Tennessine 117 Ts [294]		Oganesson 118 Og [294]		7		8		9		10		11		12					

Lanthanum 57 La 138.91	Cerium 58 Ce 140.12	Praseodymium 59 Pr 140.91	Neodymium 60 Nd 144.24	Promethium 61 Pm [145]	Samarium 62 Sm 150.36	Europium 63 Eu 151.97	Gadolinium 64 Gd 157.25	Terbium 65 Tb 158.93	Dysprosium 66 Dy 162.50	Holmium 67 Ho 164.93	Erbium 68 Er 167.26	Thulium 69 Tm 168.93	Ytterbium 70 Yb 173.04
Actinium 89 Ac [227]	Thorium 90 Th 232.04	Protactinium 91 Pa 231.04	Uranium 92 U 238.03	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]

Atomic Structure

1. History

A. 460 BC - 322 BC Democritus & Aristotle

all matter is tiny indivisible particles called atoms

all matter is made of the 4 elements - earth, air, water, & fire (more popular)

B. 1766 - 1844 John Dalton

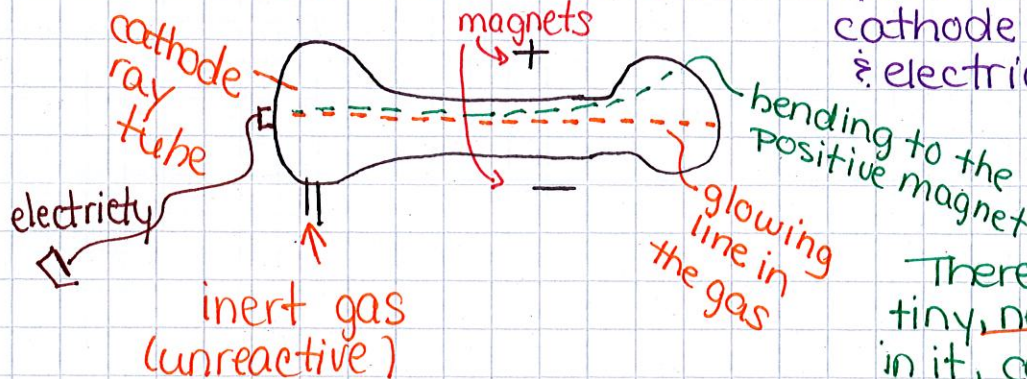
Dalton's Atomic Theory

atom



1. Elements are made of tiny, indivisible particles called atoms
2. All atoms of an element are identical
3. Atoms of 1 element are different from another
4. Atoms of elements combine in whole # ratios to form compounds. Ex) H_2O
5. Atoms cannot be created or destroyed by chemical reactions, they're only rearranged

C. 1890s JJ Thomson - experimenting w/ cathode ray tubes & electricity



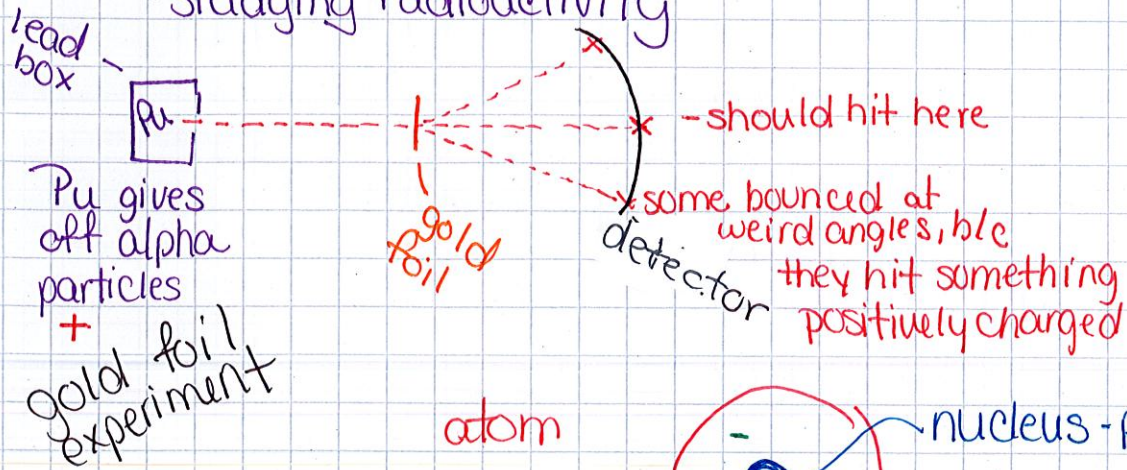
Therefore, the gas had tiny, negative particles in it, called them ELECTRONS

atom

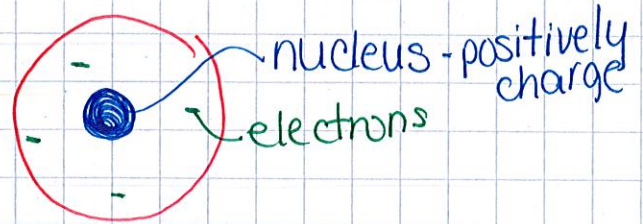


Plum Pudding model

D. 1911 Ernest Rutherford
- studying radioactivity



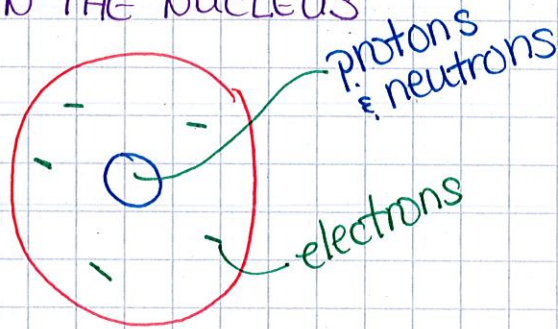
atom



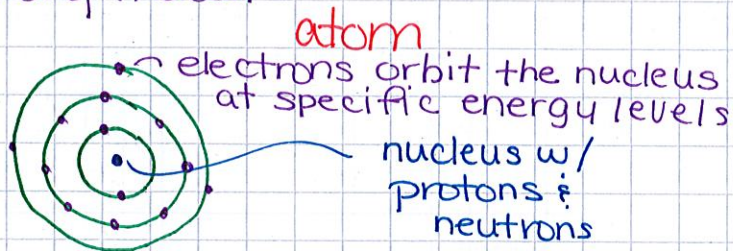
1918 - discovered positively charged PROTONS in the nucleus

E. James Chadwick 1932 - discovered NEUTRONS IN THE NUCLEUS

atom



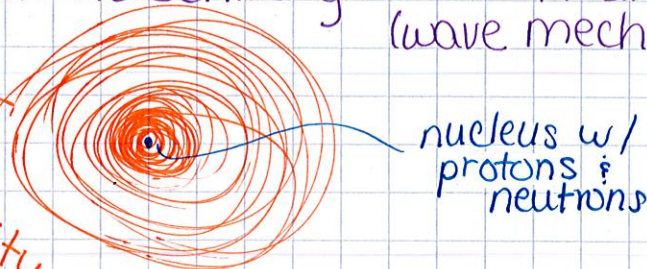
F. 1930's - 1940's Neils Bohr
Planetary model



1940's

G. Erwin Schrödinger, Albert Einstein, Neils Bohr, & Werner Heisenberg - modern atom (wave mechanical model)

electron cloud
90% probability
of finding
an electron



2. Structure of an Atom

smallest unit of a substance that retains the properties of that substance. They are mostly empty space, w/ protons, neutrons, & electrons in it.

	location	charge	mass (kg)	relative mass (to an e^-)
protons	nucleus	+1	1.673×10^{-27}	1836 x's larger
neutrons	nucleus	0	1.675×10^{-27}	1839 x's larger
electrons	e^- cloud	-1	9.11×10^{-31}	1

Atomic Number (Z) - identifies an element

= # p^+ in the nucleus

= # e^- in the e^- cloud

Mass Number (A)

= sum of the p^+ & # n^0 in the nucleus

is NOT on the periodic table

To find the # n^0 , subtract the atomic # from the mass #

Ex) Mercury

mass #	201
atomic #	80
<hr/>	
# n^0	= 121
# p^+	= 80
# e^-	= 80

Arsenic

mass #	76
atomic #	33
<hr/>	
# n^0	= 43
# p^+	= 33
# e^-	= 33

An element has 31 p^+ and 39 n^0 ,
 what is its name? gallium
 what is the atomic #? 31
 what is the mass #? 31 + 39 = 70
 how many e^- ? 31