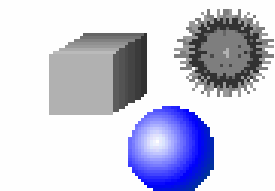


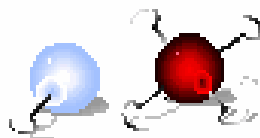
Unit 3

"Atomic Structure"

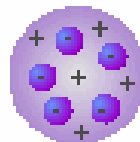
Model Timeline



~ 400 B. C.



1830



1906



1913



1924

Chemistry Plymouth North High School

Adapted from Stephen L. Cotton

I. Structure of the Nuclear Atom

■ OBJECTIVES:

- Identify three types of subatomic particles.
- Describe the basic structure of atoms.

Part 3

Distinguishing Among Atoms

■ OBJECTIVES:

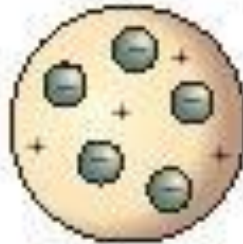
- Explain what makes elements and isotopes different from each other.
- Calculate the number of neutrons in an atom.
- Calculate the atomic mass of an element.
- Explain why chemists use the periodic table.

Evolution of the Atomic Model

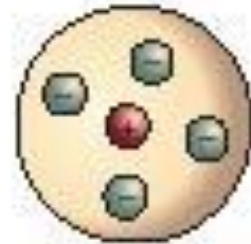
Dalton's atom



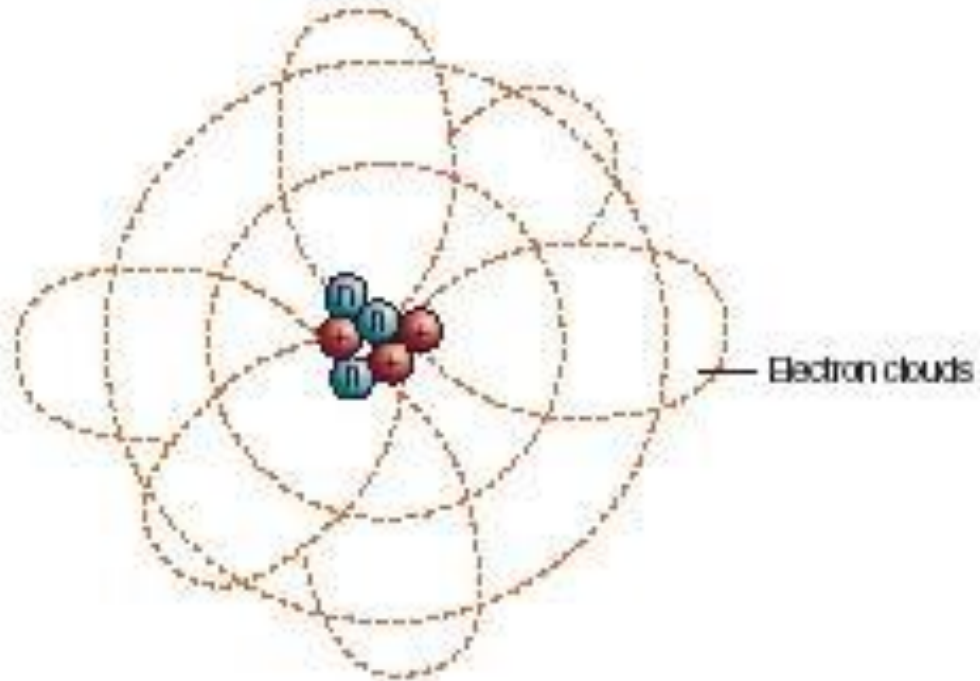
Thomson's plum-pudding atom



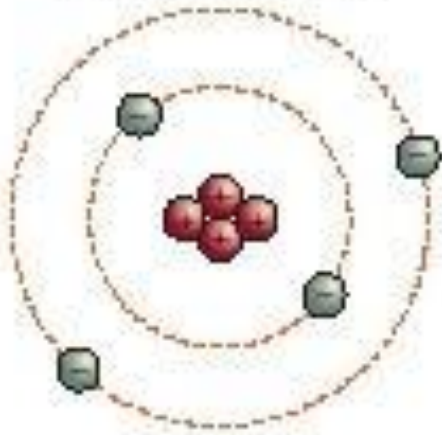
Rutherford's atom



Current orbital atom



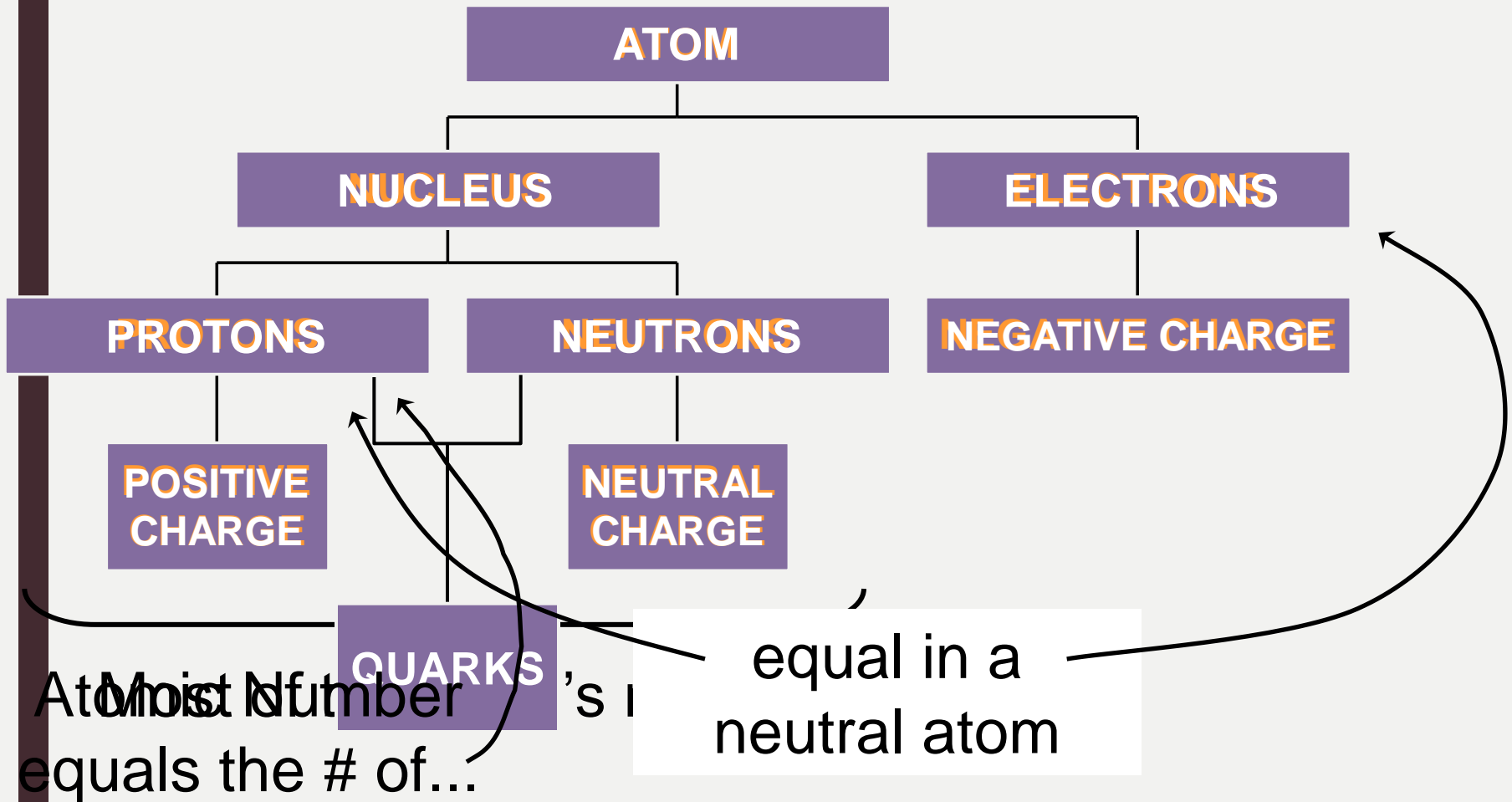
Bohr's planetary atom



Subatomic Particles

Particle	Charge	Mass (g)	Location
Electron (e^-)	-1	9.11×10^{-28}	Electron cloud
Proton (p^+)	+1	1.67×10^{-24}	Nucleus
Neutron (n^0)	0	1.67×10^{-24}	Nucleus

Subatomic Particles



Atomic Number

Atomic number (Z) of an element is the number of protons in the nucleus of each atom of that element.

Element	# of protons	Atomic # (Z)
Carbon	6	6
Phosphorus	15	15
Gold	79	79

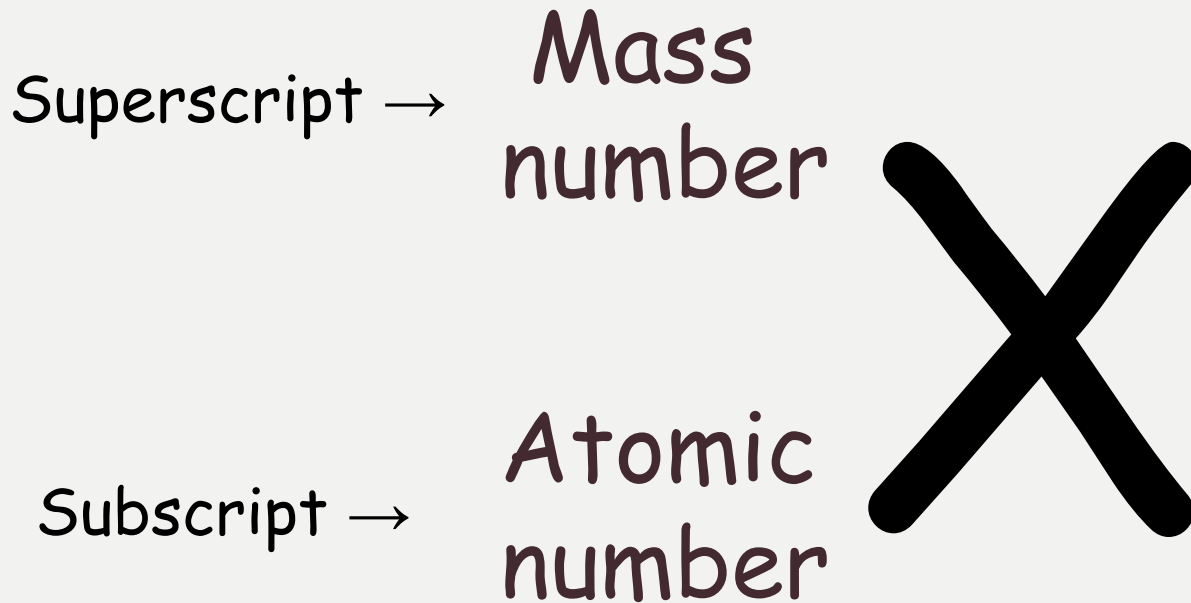
Mass Number

Mass number is the number of protons and neutrons in the nucleus of an isotope: $\text{Mass \#} = p^+ + n^0$

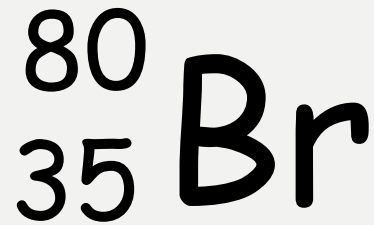
Nuclide	p^+	n^0	e^-	Mass #
Oxygen - 18	8	10	8	18
Arsenic - 75	33	42	33	75
Phosphorus - 31	15	16	15	31

Complete Symbols

- Contain the symbol of the element, the mass number and the atomic number.



Symbols



■ Find each of these:

a) number of protons

35

b) number of neutrons

45

c) number of electrons

35

d) Atomic number

35

e) Mass Number

80

Symbols

- If an element has an atomic number of 34 and a mass number of 78, what is the:

a) number of protons 34

b) number of neutrons 44

c) number of electrons 34

d) complete symbol

Symbols

- If an element has 91 protons and 140 neutrons what is the

a) Atomic number

91

b) Mass number

231

c) number of electrons

91

d) complete symbol

Symbols

- If an element has 78 electrons and 117 neutrons what is the

a) Atomic number

78

b) Mass number

195

c) number of protons

78

d) complete symbol

Atoms vs Ions

- Atoms are neutral, they have no charge.
 - # of protons (positive) = # of electrons (negative)
- Ions are formed when atoms gain or lose electrons
 - **Cations** - positively charged ions that have **LOST** electrons.
 - **Anions** - Negatively charged ion that have **GAINED** electrons.

Cations

Determine the number of protons, neutrons, and electrons in a calcium ion.



This is named the
“calcium ion”.

- a) number of protons
- b) number of neutrons
- c) number of electrons

20

20

18

It is positive because it has more protons than electrons

Anions

Determine the number of protons, neutrons, and electrons in a phosphide ion.



(This is called the “phosphide ion”, and should show dots)

- | | |
|------------------------|----|
| a) number of protons | 15 |
| b) number of neutrons | 16 |
| c) number of electrons | 18 |

It is negative because it has more electrons than protons