

Chemistry Level 1 (Revised 2008)
Section 4.3 (old book Chapter 6)
Subatomic Particles & Atomic Mass

1. Nucleons (do in class) - subatomic particle that make up nucleus (proton & neutron)
2. Atomic Number (Z) - # of protons
 Mass Number (A) - total # of proton & neutrons

Isotopes -

Two symbols (or ways of writing) for Isotopes: ${}^{12}_6\text{C}$ Carbon-12

3. Actual Masses of Subatomic Particles (Pg106 Table 4.1 new book):

	<u>Mass</u>	<u>Charge</u>	<u>Location in Atom</u>
Proton -	1.67×10^{-24} g	" + "	nucleus
Neutron -	1.67×10^{-24} g	no charge	nucleus
Electron -	9.11×10^{-28} g	" - "	outside nucleus

4. Definition of Atomic Mass:
 weighted (by # of isotope) average of the mass of all isotope in an element.
 Units for Atomic Mass: AMU (called atomic mass unit)

Do Not Fill In Below, Leave For Class

A. Calculating Atomic Mass by Exact Method:

Assume: 100 isotopes

Isotope	Actual "Mass" of One Isotope	# of Isotopes	Total "Mass" of Isotope
a. ${}^{12}_6\text{C}$	$\frac{12.000 \text{ AMU}}{100}$	$(98.89)^{100}$	1186.68 AMU
b. ${}^{13}_6\text{C}$	$\frac{13.003 \text{ AMU}}{100}$	$(1.11)^{100}$	14.43 AMU

Keep only 2 places after decimal place (don't round)

Total "mass" of all isotopes = 1201.11 AMU

Atomic "mass" = $\frac{1201.11 \text{ amu}}{(100 \text{ iso})}$ - Number of Isotopes assumed

= 12.011 AMU (really it is $\frac{12.011 \text{ amu}}{\text{"representative" isotope}}$)

Isotope Information

Name	Symbol	Mass (amu)	Natural percent abundance	atomic mass
Hydrogen	^1_1H	1.0078	99.985	1.0079
	^2_1H	2.0141	0.015	
	^3_1H	3.0160	negligible	
Helium	^3_2He	3.0160	0.0001	4.0026
	^4_2He	4.0026	99.9999	
Carbon	$^{12}_6\text{C}$	12.000	98.89	12.011
	$^{13}_6\text{C}$	13.003	1.11	
Nitrogen	$^{14}_7\text{N}$	14.003	99.63	14.007
	$^{15}_7\text{N}$	15.000	0.37	
Oxygen	$^{16}_8\text{O}$	15.995	99.759	15.999
	$^{17}_8\text{O}$	16.995	0.037	
	$^{18}_8\text{O}$	17.999	0.204	
Sulfur	$^{32}_{16}\text{S}$	31.972	95.00	32.064
	$^{33}_{16}\text{S}$	32.971	0.76	
	$^{34}_{16}\text{S}$	33.967	4.22	
	$^{36}_{16}\text{S}$	35.967	0.014	
Zinc	$^{64}_{30}\text{Zn}$	63.929	48.89	65.37
	$^{66}_{30}\text{Zn}$	65.926	27.81	
	$^{67}_{30}\text{Zn}$	66.927	4.11	
	$^{68}_{30}\text{Zn}$	67.925	18.57	
	$^{70}_{30}\text{Zn}$	69.925	0.62	