Homework Check:

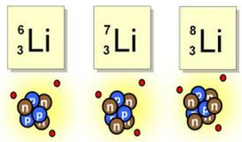
Protons	Neutrons	Electrons	Mass Number	Isotope Notation #1	Isotope Notation #2
1	0	1	1	Hydrogen-1	$^{1}_{1}H$
18	20	18	38	Argon-38	$^{38}_{18}Ar$
92	118	92	210	Uranium-210	$^{210}_{92}U$
80	100	80	180	Mercury-180	$^{180}_{80}Hg$
40	50	40	90	Zirconium-90	$^{90}_{40}Zr$
77	91	77	168	Iridium-168	$^{168}_{77}Ir$

Sep 7-3:11 PM

Average Atomic Mass

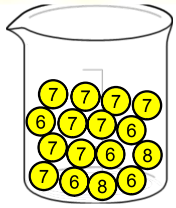
Review: Isotopes

Atoms of the same element with a different # of neutrons, so the mass is different



So, in a large sample of Lithium...

you will find some atoms with a mass of 6, and some atoms with a mass of 7, and some atoms with a mass of 8



Sep 7-3:15 PM

What is an **average?**

typical value in a set of data

How do we calculate an average?

$$\frac{x_1 + x_2 + x_3 \dots}{n_x}$$

Sep 7-3:22 PM

A **Weighted Average** is...

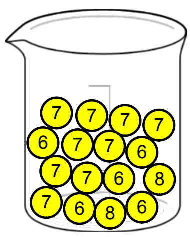
A way to find an average using percentages

Using Percent:

% = Part / Whole x 100

What is the percent of 7's in the beaker?

$$\frac{9}{16} \times 100 = 56\%$$



Sep 7-3:22 PM

Terms

Mass Number	Average Atomic Mass
= protons + neutrons	weighted average mass of all the atoms of an element
mass of 1 atom	decimal number
whole number	on the periodic table
not on the periodic table	

Sep 7-3:23 PM

Calculating Average Atomic Mass

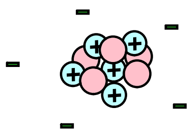
$\text{Abundance}_1 \times \text{Mass}_1 + \text{Abundance}_2 \times \text{Mass}_2 \ldots$

Mass is usually measured in amu (atomic mass units)
Abundance is a percent written as a decimal

- Abundance is the percentage of time that a particular isotope occurs in nature
- Average atomic mass is closest in mass to the most abundant isotope & between the masses of the smallest and largest isotopes

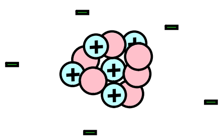
Sep 7-3:36 PM

Example #1: Calculate the average atomic mass of **Boron.**



Boron - 10

19.9% Abundance



Boron - 11

80.1% Abundance

avg. at. mass = $(\text{abund} \cdot \text{mass})_1 + (\text{abund} \cdot \text{mass})_2$

$= (.199 \cdot 10) + (.801 \cdot 11) = 10.801$

Sep 7-3:39 PM

Example #2- Chlorine has two naturally occurring isotopes, chlorine-35 and chlorine-37. The average atomic mass for chlorine is 35.453. Without doing any calculations, which isotope is more abundant? Why?

Sep 7-3:39 PM

Example #3: The atomic mass of rubidium is 85.4678 amu. The naturally occuring isotopes are ^{85}Rb = 84.9117 amu and ^{87}Rb = 86.9086 amu. Determine the percent abundance of each isotope.

.50+.50

$85.4678 = 84.9117x + 86.9086y$

$x + y = 1 \quad x = (1 - y)$
$-y \quad -y$

$85.4678 = 84.9117(1-y) + 86.9086y$

$85.4678 = 84.9117 - 84.9117y + 86.9086y$

$85.4678 = 84.9117 + 1.9969y$
$-84.9117 \quad -84.9117$

$\frac{.5561}{1.9969} = \frac{1.9969y}{1.9969}$ $= .28$

Rb-87 28%

Rb-85 72%

Sep 7-3:39 PM

Example #4: The atomic mass of Thallium is 204.3833 amu. The masses for the two stable isotopes are 202.9723 amu for thallium-203 and 204.9744 amu for thallium-205. Calculate the percent abundance of each isotope.

Sep 7-3:39 PM

Example #4: The atomic mass of Thallium is 204.3833 amu. The masses for the two stable isotopes are 202.9723 amu for thallium-203 and 204.9744 amu for thallium-205. Calculate the percent abundance of each isotope.

$204.3833 = 202.9723x + 204.9744y$

$x + y = 1 \quad x = 1 - y$
$-y \quad -y$

$204.3833 = 202.9723(1-y) + 204.9744y$

$204.3833 = 202.9723 - 202.9723y + 204.9744y$

$204.3833 = 202.9723$

Sep 7-3:39 PM