Unit 3 NAME

Class Work 11/6/13

3.7 Average Atomic Mass

SPARK

Submit topic if you didn't do so already

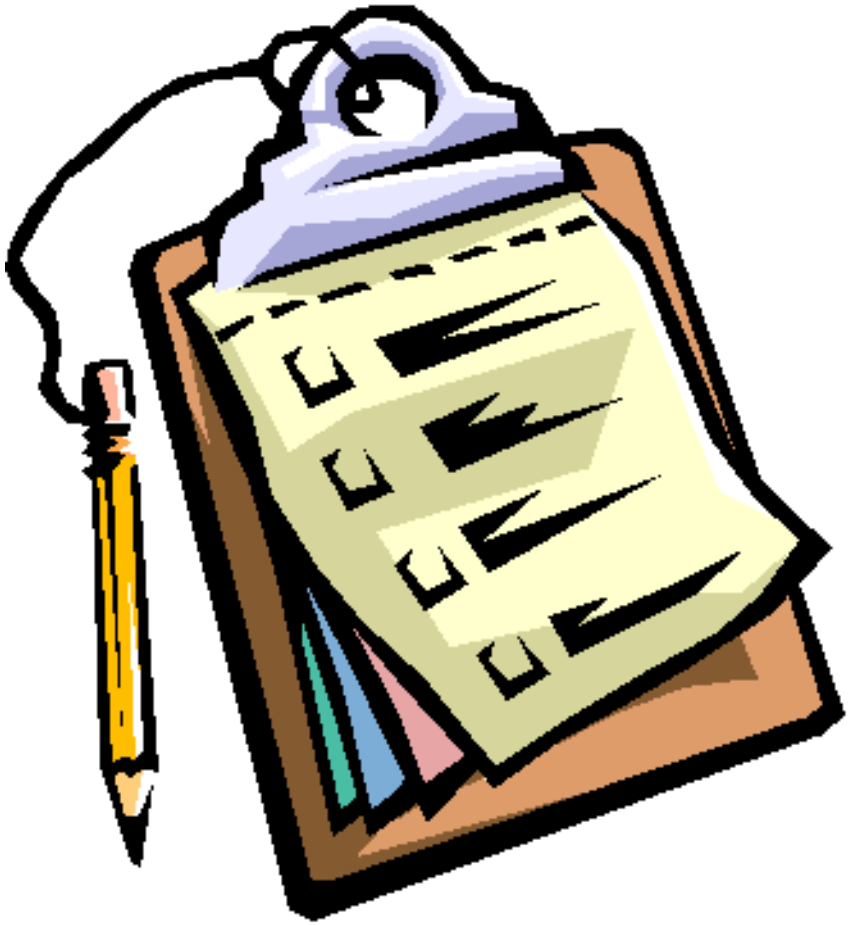
Complete Atomic Theory Quiz! Write objective when finished!

Objective

SWBAT determine the most abundant isotope based on their knowledge of weighted averages and calculate the atomic mass of an element, given the masses and ratios of naturally occurring isotopes.

Agenda:

- SPARK
- Objective
- Notes
- Practice
- Homework



Uses of Isotopes

- Cobalt – 60 is used in cancer treatments to kill tumors
- Cesium – 137 is used to kill bacteria on food
- Carbon- 14 is used to date archaeological artifacts
- Isotope ratios are used in forensics as you read in your article!

Atomic Masses

Average atomic mass is the average of all the naturally occurring isotopes of that element.

Isotope	Symbol	Composition of the nucleus	Mass Number	% occurrence in nature
Carbon-12	^{12}C	6 protons 6 neutrons	12	98.89%
Carbon-13	^{13}C	6 protons 7 neutrons	13	1.11%
Carbon-14	^{14}C	6 protons 8 neutrons	14	<0.01%

Based on the percentages, what do you think the atomic mass will be closer to?

Isotope	Mass (amu)	% Abundance
S-32	31.972	95.002
S-33	32.971	0.76
S-34	33.967	4.22
S-36	35.967	0.014

How do we calculate average atomic mass?

1. Convert percentages to decimals by dividing by 100 (move the decimal place two times to the left)
2. Multiply the decimal by the mass for the isotope
3. Add them up!

Watch me!

Calculate the average atomic mass of Carbon!

- ^{12}C - 98.89%
- ^{13}C - 1.11%

Let's do it together!

Element x has two natural isotopes. The isotope with a mass of 10.012 amu (^{10}X) has a relative abundance of 19.91%. The isotope with a mass of 11.009 amu (^{11}X) has a relative abundance of 80.09% Calculate the atomic mass of this element.

Evaluate!

Your turn!

Naturally Occurring Isotopes of Silicon

Isotope	Atomic Mass (atomic mass units)	Percent Natural Abundance (%)
Si-28	27.98	92.22
Si-29	28.98	4.69
Si-30	29.97	3.09

- CHECK YOUR WORK! Does your answer make sense?

Your turn!

Naturally Occurring Isotopes of Silicon

Isotope	**Atomic Mass** (atomic mass units)	**Percent Natural Abundance** (%)
Si-28	27.98	92.22
Si-29	28.98	4.69
Si-30	29.97	3.09

Exit Ticket

Calculate the atomic mass of lithium using this table:

Lithium Isotopes

Isotope	**Atomic Mass** (u)	**Natural Abundance** (%)
Li-6	6.02	7.5
Li-7	7.02	92.5

HOMEWORK

Complete 3.7 HW

Work on Identify/Collect/Analyze/Evaluate

Due =

Anions: Friday!

Cations: Tuesday!