Note: Calculating % abundances of two isotopes is not on this worksheet but will be on the quiz - See classwork or NB

Accelerated Chemistry
Unit 2 - Distinguishing among atoms – atomic mass calculations
Homework

Name..... Key .....
Hour.....

Directions: Read each statement and select the best answer. Place your answers on the lines provided to you.

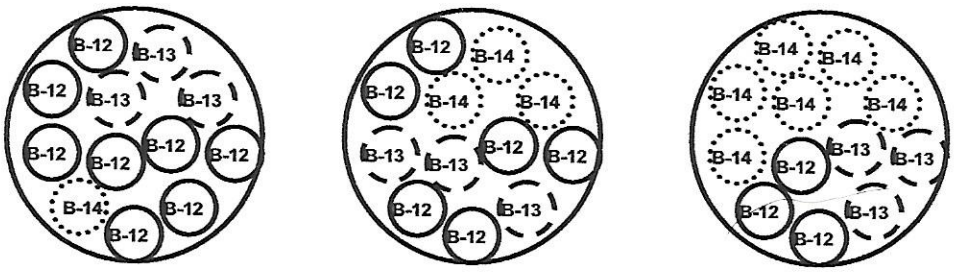
1. B Hypothetical element Z consists of two isotopes; Z – 25 and Z – 27. The atomic mass of element Z is 26.896 amu. Which isotope has the largest percent abundance?
   a. Z – 25
   b. Z – 27
   c. They have equal abundances.
   d. Can not be determined from information given.

2. A Hypothetical element Y has an atomic mass of 32.06 amu. It consists of four different isotopes, Y – 32, Y – 33; Y – 34; Y – 35. Which isotope has the largest percent abundance?
   a. Y – 32
   b. Y – 33
   c. Y – 34
   d. Y – 35
   e. Can not be determined from information given.

3. B Hypothetical element A has three different isotopes; A – 102 (101.98 amu); A – 104 (103.98 amu); A – 106 (106.0 amu). Which statement is true?
   a. Element A's atomic mass can be less than 101.98 amu.
   b. Element A's atomic mass can not be greater than 106.0 amu.
   c. Element A's atomic mass is probably 105.0 amu.
   d. All of the isotopes have the same number of neutrons

4. B Hypothetical element X has four different isotopes. Isotope X – 100 has an abundance of 50%. Isotope X –102 has an abundance of 10%. Isotope X – 104 has an abundance of 30%. What is the abundance of the fourth isotope X – 106?
   a. 30% b. 10% c. 40% d. 50%

5. B Hypothetical element B has three different isotopes. Isotope B – 12 has an abundance of 50%, B – 13 has an abundance of 25% and B-14 has an abundance of 25%. Which picture below best depicts element B?



A B C

Directions: Complete the following questions. Show all relevant work.

6. Copper has two naturally occurring isotopes: copper-63 and copper-65. The abundance of copper-63 is 69.17%; the atomic mass of copper-63 is 62.94 amu. The relative abundance of copper-65 is 30.83%; the atomic mass is 64.93 amu. Calculate the atomic mass for the element copper.

$$\frac{(69.17 \times 62.94\text{amu}) + (30.83 \times 64.93\text{amu})}{100}$$

$$= \frac{4354\text{ amu} + 2002\text{amu}}{100} = \frac{6356\text{amu}}{100} = \boxed{63.56\text{ amu}}$$

(63.56 amu)

7. Magnesium has three naturally occurring isotopes: magnesium – 24, magnesium – 25 and magnesium – 26 as summarized in the table below. Calculate the atomic mass for the element magnesium.

Isotope	Atomic mass (amu)	Percent abundance
Magnesium - 24	23.985042	78.99%
Magnesium - 25	24.985837	10.00%
Magnesium - 26	25.982593	11.01%

$$\frac{(23.98504 \times 78.99) + (24.985837 \times 10.00) + (25.982593 \times 11.01)}{100}$$

$$\frac{1895\text{ amu} + 249.9\text{ amu} + 286.1\text{amu}}{100} = \frac{2431\text{amu}}{100} = \boxed{24.31\text{ amu}}$$

(24.31 amu)

8. The element sulfur has an atomic mass of 32.06 amu. Sulfur has four naturally occurring isotopes, S – 32, S – 33, S – 34 and S – 36 as summarized in the table below. What is the atomic mass of S – 34.

Isotope	Atomic mass (amu)	Percent abundance
S – 32	31.972	95.002%
S – 33	32.971	0.76%
S – 34	?	4.22%
S – 36	35.967	0.014%

$$\frac{(31.972 \times 95.002) + (32.971 \times 0.76) + (4.22x) + (35.967 \times 0.014)}{100}$$

$$32.06 = \frac{3037.4\text{ amu} + 25\text{amu} + 4.22x + 0.50\text{amu}}{100} = \frac{\text{[illegible]}}{100}$$

(34.00 amu)

$$32.06 = \frac{3063 + 4.22x}{100}$$

$$3206 = 3063 + 4.22x \rightarrow \frac{143}{4.22} = \frac{4.22x}{4.22} \rightarrow x = \boxed{33.9\text{ amu}}$$