Colegio Valle Verde Carretera
Chemistry Honors

**Hoja de trabajo**
**Cálculo de la masa atómica promedio**

**Instrucciones:**
La siguiente actividad tiene como fin en mente que puedas ejercitar tus aprendizajes sobre el tema de cálculo de la masa atómica y porcentaje isotópico, se encuentra basada en tres experiencias diferentes: tu libro de química, la Universidad Autónoma de México y la Universidad Tecnológica Metropolitana de Chile.

**Chemistry OpenStax**

1. (22) An element has the following natural abundances and isotopic masses: 90.92% abundance with 19.99 amu, 0.26% abundance with 20.99 amu, and 8.82% abundance with 21.99 amu. Calculate the average atomic mass of this element.

2. (23) Average atomic masses listed by IUPAC are based on a study of experimental results. Bromine has two isotopes, $^{79}Br$ and $^{81}Br$, whose masses (78.9183 and 80.9163 amu, respectively) and abundances (50.69% and 49.31%, respectively) were determined in earlier experiments. Calculate the average atomic mass of bromine based on these experiments.

3. (24) Variations in average atomic mass may be observed for elements obtained from different sources. Lithium provides an example of this. The isotopic composition of lithium from naturally occurring minerals is 7.50% $^{6}Li$ and 92.5% $^{7}Li$, which have masses of 6.01512 amu and 7.01600 amu, respectively. A commercial source of lithium, recycled from a military source, was 3.75% $^{6}Li$ (and the rest $^{7}Li$). Calculate the average atomic mass values for each of these two sources.

   Natural mineral source:

   Recycled military source:

4. (25) The average atomic masses of some elements may vary, depending upon the sources of their ores. Naturally occurring boron consists of two isotopes with

accurately known masses ($^{10}B$ 10.0129 amu and $^{11}B$ 11.00931 amu). The actual atomic mass of boron can vary from 10.807 to 10.819, depending on whether the mineral source is from Turkey or the United States. Calculate the percent abundances leading to the two values of the average atomic masses of boron from these two countries.

Turkey source:

US source:

5. (26) The $^{18}O$:$^{16}O$ abundance ratio in some meteorites is greater than that used to calculate the average atomic mass of oxygen on earth. Is the average mass of an oxygen atom in these meteorites greater than, less than, or equal to that of a terrestrial oxygen atom.

greater than

less than

equal

**Ejercicios UNAM**

1. Para determinar la masa atómica de cada uno de los isótopos del silicio que integran una mezcla, se analizó ésta en un espectrómetro de masas. Con la información de la tabla siguiente, calcule el porcentaje de abundancia de los isótopos $^{28}Si$ y $^{29}Si$. Considere que la masa atómica relativa promedio del silicio es de 28.086 [uma]

| Isótopo | [%] de abundancia | Masa atómica [uma] |
|---|---|---|
| $^{28}Si$ | A | 27.9769 |
| $^{29}Si$ | B | 28.9765 |
| $^{30}Si$ | 3.09 | 29.9738 |

A =

B =

2. El magnesio (Z = 12) tiene tres isótopos: el 78.70 % de los átomos del metal tienen 12 neutrones, 11.13 % tienen 13 neutrones y 10.17 % tienen 14 neutrones. Calcule la masa atómica relativa promedio aproximada del magnesio.

**Ejercicios - UTEM, Chile**

1. El elemento boro consiste de los 2 isótopos: 10 B y 11 B de masa atómicas de 10,01 y 11,01 uma correspondientemente. La abundancia relativa del primero es 20,0 %. La abundancia del segundo isótopo y la masa atómica del boro son respectivamente:

   a) 80,0 % ; 11,81 uma

   b) 80,0 % ; 10,81 uma

   c) 70,0 % ; 10,81 uma

   d) 70,0 % ; 10,81 uma

   e) 90,0 % ; 10,83 uma

2. El galio presenta una masa atómica de 69,7200 u.m.a. En la naturaleza se encuentra en forma de dos isótopos, Ga (A=69; Z=31) Ga (A=71; Z=31) sus masas isotópicas son respectivamente 68,9257u.m.a. y 70,9249 u.m.a. La abundancia de cada isótopo en la naturaleza es respectivamente:

   a) 29,731% ; 70,269%

   b) 49,731% ; 50,269%

   c) 60,269% ; 39,731%

   d) 50,269% ; 49,731%

   e) 49,731% ; 50,269%

3. En la naturaleza, el elemento plomo (Pb) se presenta como 4 isótopos, cuyos datos son:

| Isótopo | Masa (u.m.a) | Abundancia relativa (% ) |
|---|---|---|
| 204 Pb | 202,973 | 1,48 |
| 206 Pb | 205,9745 | 23,60 |
| 207 Pb | 206,9759 | 22,60 |
| 208 Pb | 207,9766 | 52,30 |

a) 207,162 uma

b) 206,162 uma

c) 205,162 uma

d) 202,622 uma

e) 207, 342 uma