

This is ACA # 5, our fifth ACA of the Spring semester. It is OK to use your textbook, but if you can answer the questions without it that is OK too.

I recommend you print out this page and bring it to class. [Click here](#) to show a set of five ACA5 student responses, randomly selected from all of the student responses thus far, in a new window.

John, here are your responses to the ACA and the Expert's response.

1. Complete the following table by entering the number of protons, electrons and neutrons for the two isotopes listed;

Isotope	Protons	Electrons	Neutrons
^{16}O	8 (8) <i>93% 4% 16</i>	8 (8) <i>89% 3% 16</i>	8 (8) <i>94%</i>
^{95}Mo	42 (42) <i>87% 4% 47 5% 95</i>	42 (42) <i>74% 13% 53</i>	53 (53) <i>62% 15% 42</i>

The superscript is called the mass number and is equal to the number of protons in an atom of the isotope of the element plus the number of neutrons in an atom of the isotope of that element.

$$\text{Mass number} = \# p^+ + \# n^0$$

Knowing the symbol for the element you can get the atomic number, Z, for the element. The atomic number is equal to the number of protons in any atom of that element. The atomic number is also the number of electrons AS LONG AS the element is neutral (has no charge).

For the isotope of molybdenum ^{95}Mo the atomic number is 42, so there must be 42 protons and 42 electrons. The mass number for this isotope is 95, so we would subtract 42 from 95 to determine the number of neutrons in the isotope. In this case $95 - 42 = 53$ neutrons.

2. One of the cations listed in Table 2.4 is Mo^{4+} . Complete the following table for the isotope of molybdenum with a 4+ charge.

Isotope	Protons	Electrons	Neutrons
$^{95}\text{Mo}^{4+}$	42 (42) <i>77% 5% 46</i>	38 (38) <i>63% 7% 42 5% 46</i>	53 (53) <i>61% 4% 54 7% 38</i>

For the isotope of molybdenum $^{95}\text{Mo}^{4+}$ the atomic number is 42, so there must be 42 protons. The number of electrons is NOT the same as the number of protons, because this atom of molybdenum has a plus for charge. This means the atom has four electrons fewer than 42, or 38 electrons. The mass number for this isotope is 95, so we would subtract 42 from 95 to determine the number of neutrons in the isotope. In this case $95 - 42 = 53$ neutrons.

3. For each of the following indicate whether the element is a metal, or a nonmetal.

a) hydrogen nonmetal (nonmetal) *97%*

b) lead metal (metal) *99%*

c) titanium metal (metal) *99%*

d) phosphorus nonmetal (nonmetal) *95%*

4. The formula for one kind of sugar is $\text{C}_6\text{H}_{12}\text{O}_6$.

a) How many carbon atoms in this sugar? 6 (6) *97%*

b) How many hydrogen atoms in this sugar? 12 (12) *96%*

c) How many oxygen atoms in this sugar? 6 (6) *94% (2% 12)*

d) How many oxygen molecules in this sugar? 0 (0) *20% 17%(1) 29%(3) 21%(6) 3%(12)*

This is a question that almost every student misses the first time. We have not yet defined a formula, but you may remember from high school chemistry. A formula includes the ratio of atoms of the element. So $\text{C}_6\text{H}_{12}\text{O}_6$ contains 6 carbon atoms, 12 hydrogen atoms and 6 oxygen atoms. There are NO hydrogen, H_2 , or oxygen, O_2 , molecules in $\text{C}_6\text{H}_{12}\text{O}_6$. The only substance that contains hydrogen molecules, H_2 , is a sample of the element hydrogen. This is the same for oxygen and every other diatomic element.

5. Only two isotopes of copper are known to exist, ^{63}Cu has a isotopic mass of 62.9295989 u and ^{65}Cu has a isotopic mass of 64.9277929 u. The percent abundance for ^{63}Cu is 69.17% and for ^{65}Cu the percent abundance is 30.83%. Calculate the relative weighted average atomic weigh, in atomic mass units (u) for the element copper. *69% 13% CNA 18% wrong math*
63.55

$$\begin{aligned} \text{(RWAAM)} &= \text{isotopic mass } (^{63}\text{Cu}) * \text{Fractional abundance } (^{63}\text{Cu}) + \text{isotopic mass } \\ & (^{65}\text{Cu}) * \text{Fractional abundance } (^{65}\text{Cu}) \\ &= 62.9295989 \text{ u} * 0.6917 + 64.9277929 \text{ u} * 0.3083 \end{aligned}$$

= 63.55 u)

6. Is there anything about the questions that you feel you do not understand? List your concerns/questions.

nothing

7. If there is one question you would like to have answered in lecture, what would that question be?

nothing