

Name _____ Date _____ Period _____

Chem 03-04 Reteach Guide - Mass Number (Addison Wesley Section 4.5)

The mass of an atom is concentrated in its nucleus, which consists of protons and neutrons. The mass of a single proton or a single neutron is approximately one atomic mass unit (amu) each. The atomic mass unit is 1/12th the mass of the carbon-12 atom. The sum of the masses of the protons and neutrons in the nucleus gives us the mass of the atom measured in amu's. In turn, the mass of an atom is equal to the total number of protons and neutrons. The mass of an atom is referred to as the mass number.

$$\text{mass number} = \text{mass of the atom} = \text{number of protons and neutrons}$$

The atomic number of an atom is the total number of protons. The atomic mass number of an atom is the total number of neutrons and protons. Consequently, it is possible to determine the number of neutrons in an atom.

$$\begin{aligned}\text{number of neutrons} &= \text{mass number} - \text{atomic number} \\ &= (\text{protons} + \text{neutrons}) - \text{protons}\end{aligned}$$

Refer to the periodic table in the textbook. Note the symbol **Na** in the first column on the left. **Na** is the chemical symbol for sodium which comes from the first two letters of its Latin name, natrium. How many neutrons does sodium have? The mass number of 23 minus the atomic number of protons (11) equals the number of neutrons. Therefore, sodium has 12 neutrons.

One way to write the name for a single atom is to state the element name and then the mass number of that atom. Carbon has two isotopes, carbon-12 and carbon-14. This is called the hyphen notation. Another way is to write the symbol notation with the mass number on top and the atomic number on the bottom in front of the atomic symbol. Sodium-23 written in symbol notation is:



Symbol notation allows an easy calculation to find the neutrons by subtracting the atomic number from the mass number.

Apply

1. Use the periodic table to help you find the answers to the following problems:

An atom has 23 neutrons and 18 protons.

- a) What is its mass number? _____ What is its atomic number? _____

An element has 80 electrons and 80 protons.

- b) What is its atomic number? _____ What is its atomic mass? _____

How many neutrons does it have? _____ What is its chemical symbol? _____

An atom has a mass number of 19 and has 9 electrons.

- c) Which element is it? _____ What is its atomic number? _____

2. Aluminum and silicon have a mass number difference of approximately one. How can this be?