Name: _____

Block: _____

Atomic Mass Activity

The purpose of this activity is to get a sense of the mass number of an atom. You will use the following representations for sub-atomic particles:

- **Protons**: dark-colored marbles
- **Neutrons**: light-colored marbles
- **Electrons**: paper circles

1. First, you need to find the average mass of your marbles (protons & neutrons) by weighing several of them to the nearest 0.1 g on a balance, and dividing by the number of marbles.
   Hint: use ten marbles, because it's easy to divide by ten.

   Total mass: _____ g # Marbles: _____ Ave. mass: _____ g

   What is the name of the unit of measurement that your average mass of a marble represents?

2. Find the element **carbon** (C) on the periodic table. Its atomic number is 6, which means that it has six protons. We are representing the isotope of carbon that has 6 protons, 6 neutrons and 6 electrons. Place six protons (dark-colored marbles), six neutrons (light-colored marbles) and six electrons (paper circles) on the balance tray and measure the mass.

   Total # marbles: _____

   Mass of carbon with 6 protons, 6 neutrons, & 6 electrons: _____ g

3. Divide the mass by your average mass of a marble from step #1.

   "Atomic mass" of carbon with 6 protons, 6 neutrons, & 6 electrons: _____ amu

4. Add one more neutron. You now have carbon with 6 protons, 7 neutrons, and 6 electrons.

   mass: _____ g # marbles: _____

   Mass ÷ average mass of marble: _____ amu

5. Add four more electrons. You now have carbon with 6 protons, 7 neutrons, and 10 electrons.

   mass: _____ g # marbles: _____

   Mass ÷ average mass of marble: _____ amu

6. Repeat this process for each of the following elements:

   (a) Nitrogen with 7 protons, 7 neutrons and 7 electrons

   mass: _____ g # marbles: _____

   Mass ÷ average mass of marble: _____ amu

   (b) 7 protons (nitrogen), 7 neutrons and 10 electrons

   mass: _____ g # marbles: _____

   Mass ÷ average mass of marble: _____ amu

   (c) 7 protons (nitrogen), 8 neutrons, and 7 electrons

   mass: _____ g # marbles: _____

   Mass ÷ average mass of marble: _____ amu

   (d) 7 protons (nitrogen), 9 neutrons, and 10 electrons

   mass: _____ g # marbles: _____

   Mass ÷ average mass of marble: _____ amu

   (e) 3 protons (lithium), 3 neutrons, and 3 electrons

   mass: _____ g # marbles: _____

   Mass ÷ average mass of marble: _____ amu

   (f) 3 protons (lithium), 4 neutrons, and 2 electrons

   mass: _____ g # marbles: _____

   Mass ÷ average mass of marble: _____ amu

Questions

1. Did the number of dark-colored marbles (protons) affect the mass of your atoms?

2. Did the number of light-colored marbles (neutrons) affect the mass of your atoms?

3. Did the number of paper circles (electrons) affect the mass of your atoms?

4. How would you calculate the mass number of an atom, using the number of protons, neutrons, and electrons?