

Name: _____ Period: _____ Date: _____

Unit 3 –Atomic Structure

Test Review

Evolution of the Atom

1. List the 4 main points of Dalton's Atomic Theory?

2. While working with the _____, a gas discharge tubes with metal plates containing positively charged anodes and negatively charge cathodes _____ discovered that atoms have electrons and thought that they were embedded in positively charged material.

3. _____ proposed that matter is composed of atoms and the atoms of an element are identical. His Atomic Theory suggested that atoms can be thought of as being much like a small uniformly solid ball. This model is called the _____

4. _____, fired alpha particles at a thin sheet of gold in his famous _____. Expecting the alpha particles to be blocked, he discovered almost all of them went through the thin gold sheet and concluded that there is a small, dense, positively charged nucleus.

5. _____ proposed that electrons travel in electron clouds.

6. _____ suggested that electrons travel in well-defined paths.

7. _____ proposed that all matter is made up of tiny particles called "atomos" (from the word that means "indivisible.")

8. _____ determined the nucleus contained an additional particle that traveled close to the same speed of a proton, thereby having approximately the same mass as a proton yet did not have a charge. This addition particle he named _____, due to it having a neutral charge.

Atomic Particles

1. Atomic number is the number of _____ in an atom. If the atom is neutrally charged then the atomic number will also represent the number of _____ in the atom.

2. The _____ is the weighted average mass of an atom in a naturally occurring sample of the element. The weighted average reflects both the _____ and the relative natural abundances of the _____ of that element as they occur in nature.

3. In determining the number of particles in a neutrally charged atom. We take the atomic mass and round it to a whole number. When we round the atomic mass we refer to this rounded number as the _____.

4. The _____ is equal to the number of protons and _____ in the atom.

5. Label the information provided from the periodic table below.

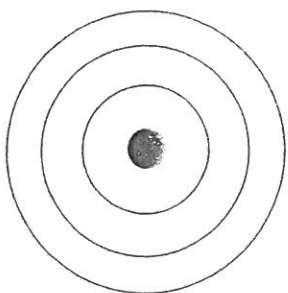
18
Ar
Argon
39.948

6. Find the numbers of protons, neutrons, and electrons for atoms of the following elements.

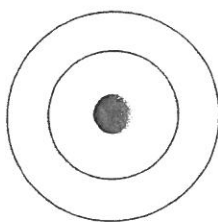
Name of Element	Element Symbol	Mass Number	Atomic Number	Protons	Neutrons	Electrons
Boron	B	11	5	5	6	5
Sodium		24	11			
Copper			29		35	
	Pb	207				82
Molybdenum	Mo			42	54	
Thallium	Tl	204	81			
	H	1			0	
Carbon		12				
	N			7		
	Ba					56
Calcium				20		
	Si					14
Argon	Ar				22	18

Electron Configuration

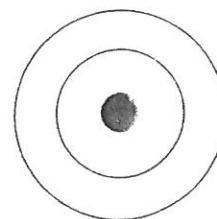
1. Bohr's model accounts for the _____ number of electrons in an atom.
2. According to Bohr, how many electrons can each level hold? 1st = ____ 2nd = ____ 3rd = ____ 4th = ____
3. What term is used for the electrons in the outermost shell or energy level? _____.
4. The electrons in the outermost shell are the electrons that form _____.
5. For each element, write the total number of electrons on the line. Then color in the correct number of electrons for each orbit. Remember, fill the orbit closest to the nucleus first, but never exceed the number each orbit can hold. You may use your periodic table.



Sodium (Na) _____
electrons



Carbon (C) _____



Oxygen (O) _____

6. Draw your own Bohr model diagrams for the following atoms:

Lithium (Li)

Magnesium (Mg)

Aluminum (Al)

- Lewis Dot Structures accounts for only the _____ electrons in an atom. Remember these electrons are found on the outermost energy level.
- Draw the Lewis Dot Structure for the elements below. You may use your Bohr diagrams you completed in question 5 and question 6 in this section. Remember to start with your first dot on the right and fill one dot at a time moving counter clockwise. (Right, Top, Left, Bottom and repeat)

Na

C

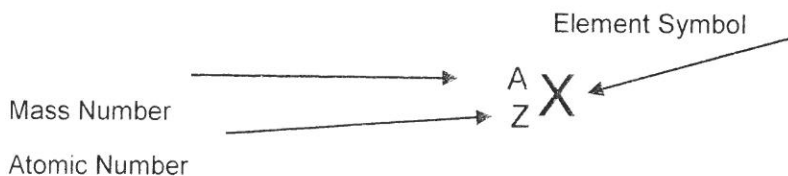
O

Isotopes

- Isotopes of a given element have the same number of _____ but a different number of _____.
- In hyphen notation (nuclear notation). The number next to the hyphen is the _____.
Ex. Chromium – 58
- Complete the table for each of the following isotopes. Assume all atoms are neutral. You may use your periodic table.

Isotope name	atomic #	mass #	# of protons	# of neutrons	# of electrons
Uranium-235					
Uranium-238					
Boron-10					
Boron-11					
Iron- 56					
Iron-58					

- When symbols are used to represent an isotope (Isotopic Notation) the mass number is written next to the symbol on the top left. The atomic number is written on the bottom left. Recall the atomic number is the number of protons. The mass number is number of protons and neutrons.



5. Complete the following chart. Assume all atoms are neutral.

Isotope name	atomic #	mass #	# of protons	# of neutrons	# of electrons
235 92 U					
238 92 U					
10 5 B					
11 5 B					

Atomic Mass Unit (amu)

- Atomic mass unit is defined as 1/12 the mass of Carbon-12. Carbon 12 has 6 neutrons and 6 protons and its mass is set at 12 amu. The 12 protons and neutrons account for nearly all the mass so a single proton or a single neutron is 1/12 of the mass or 1 amu.
- Scientist picked a reference isotope as a standard every atom is compared to that reference isotope which is Carbon-12
- The atomic mass listed for each element on the periodic table is relative to Carbon-12
- Recall in nature most elements occur as a mixture of two or more isotopes. It is assumed that the composition of a sample of an element (in terms of the **percent natural abundances** of each of the element's isotopes) is the same everywhere on Earth.

Calculation of Atomic Mass

Atomic mass is also known as atomic weight. Recall Atomic mass is the weighted average mass of an atom in a naturally occurring sample of the element. A weighted average mass reflects both the mass and the **relative natural abundance** of the isotopes of that element as they occur in nature.

Ex- What is the average atomic mass of this sample of Carbon?

^{12}C	12.0014 amu	87.3 %
^{14}C	13.9960 amu	12.7 %

$$12.014 \text{ amu} (0.873) + 13.9960 \text{ amu} (0.127) = 12.254 \text{ amu}$$

1. Calculate the average atomic mass for Li if 7.5% of Li atoms are ^6Li with a mass of 6.0151223 amu and 92.5% are ^7Li with a mass of 7.0160041 amu.
2. Find the atomic mass for B if 19.9% of B atoms are ^{10}B with a mass of 10.0129371 amu and 80.1% are ^{11}B with a mass of 11.0093055 amu.