Name:_____ Block:_____ **Chemthink: Atomic Structure, Ions, & Isotopes**

Chemthink: Atomic Structure ***(must do the question set for this strand)***

PROTONS are located in the _____ region called the _____. The number of **PROTONS** determines what _____ an atom will be.

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C
12.01

Is the _____ number which represents the number of _____. It is a whole _____ that appears on the _____ table above the _____ symbol. _____ have a mass of _____ amu; one of the _____ parts of an atom that have a charge of _____.

NEUTRONS are located in the _____ of the atom called the _____. **NEUTRONS** do not have a _____ but hold the _____ together in the nucleus. The mass of a **NEUTRON** is about the same as the _____, _____ amu.

ELECTRONS are the _____ of the 3 subatomic particles and add virtually nothing to the _____ of the atom. **ELECTRONS** are in constant _____ in around the nucleus which means _____ distinct outer surface to the atom. **ELECTRONS** have a charge of _____ and at times _____ from _____ atom to another OR can be _____ between two separate atoms. If an atom is neutral, it will have the same number of _____ and _____. **ELECTRONS** are involved in _____ chemical reactions.

	charge	**relative mass**	**location**	**importance**
PROTON				
ELECTRON				
NEUTRON				

Chemthink: Ions

An **ION** is created when an atom _____ or _____ electrons. **IONS** have _____ that come from an imbalance of _____ _____ and _____ _____. _____ don't contribute to the mass of the atom, gaining or losing _____ does not change the _____ of atom. _____ can behave very differently than the atoms which they were formed from.

	Protons	**Electrons**	**Neutrons**	**Total Charge**	**Symbol for**	**Explain the total charge**
Lithium atom						
Lithium ion						
Oxygen atom						
Oxygen ion						

IMPORTANT:

Negative Ions Formed by:	
Positive Ions Formed by:	

PROTONS are NEVER _____or _____. Only _____ can be gained or lost not _____.

Chemthink: Isotopes

At first, all of the atoms appear to be **_____.** The first atom of boron has ____ protons, ____ neutrons and ____ electrons. The second atom of boron has _____ protons, _____ neutrons, and _____ electrons. The number of _____ determines the type of atom. Both of these atoms are boron because they both have ____ protons. _____ determine the chemistry of an atom. Since both atoms have _____ number of electrons, both atoms are chemically **_____._____** hold the nucleus together and add _____ to the atom. Since the first atom has one more neutron, it will be _____ than the second atom.

Summary: Isotopes are the same by: being the _____ element, having the same number of _____ & _____, and _____ alike, they _____ the same way. The only difference between the isotopes is the number of _____, the only way to tell them apart is by their _____.

Symbol: Total of all the particles in the _____; total # of _____& _____; the _____ number → $^{10}_{5}B$ The other isotope symbol is: $^{\_\_}_{\_\_}B$

_____; the _____ number

The atomic number of this isotope is _____as the other atom because both atoms have ____ protons. The mass number of this isotope is _____ .One of the isotopes has one more _____, so the total number of protons and neutrons is ____ instead of _____. To name the isotope, simply add the _____ number to the name of the element. The isotopes above are boron ____ and boron ___.

Calculating average atomic mass: There are more atoms of boron _____.

Boron-11 occurs _____ % and Boron – 10 occurs _____ % of the time. If we were to average these numbers simply:

$$\frac{11.01 + 10.01}{2} \boxed{} \quad 10.81 \text{ amu}$$

Remember, this value is the average atomic mass it's from the _____ _____.

To calculate the actual average, 10.81 amu, the _____ of each isotope must be known and we will use the percent _____.

Must convert the percent to a decimal, and then multiply the decimal by the mass of each isotope.

isotope	**%**	**mass(amu)**	
boron-11	80.0	_____	_____ x 11.01 = _____ amu
boron-10	20.0	_____	_____ x 10.01 = _____ amu

Then add the values : 8.81amu +2.00amu = _____amu . This sum is the average atomic mass, which is weighted by the abundance of each isotope.

$^{\_\_}_{12}Mg$ $^{\_\_}_{12}Mg$ $^{\_\_}_{12}Mg$ Each isotope has ____ protons because it is a magnesium atom. Remember that **mass number** = protons + _____ .

magnesium-24 has ___ neutrons (24 = 12 + ___) ; magnesium-25 has ___ neutrons (25 = 12 + ___); magnesium-26 has ___ neutrons (26 = 12 + ___)

Calculate the average atomic mass for magnesium

isotope	**% abundance**	**mass (amu)**			
magnesium-24	79.00	_____	_____	x	23.99 amu = _____ amu
magnesium-25	10.0	_____	_____	x	24.99 amu = _____ amu
magnesium-26	11.0	_____	_____	x	25.98 amu = _____ amu
					average atomic mass = _____ amu

Summary: All atoms can be referred to as _____. We only use the term isotope when we need to distinguish between atoms of the _____ element that have different numbers of _____**.** This is usually not important because the number of neutrons _____ affect the way an atom reacts chemically. Different numbers of neutrons does affect the _____ of the atom and this is important when we consider _____ reactions. Mass number represents the total number of _____ & _____ whereas the atomic number represents the number of _____ in the nucleus.

Applying What You Learned:

1. What is the average atomic mass of uranium, atomic number 92?

   Where did you find that number?

2. How are uranium-235 and uranium-238 the same with regard to the number of protons, electrons, neutrons?
3. How are they different with regard to the number of protons, electrons, neutrons?
4. Write the symbols for uranium-234, uranium-235 and uranium-238.

5. Calculate the average atomic mass of uranium, given the abundance and mass data below. Follow the steps above for calculating average atomic mass!

	Percent abundance	**mass (amu)**
uranium-238	99.27 %	238.05 amu
uranium-235	0.7200 %	235.04 amu
uranium-234	0.400100 %	234.04 amu