Name: _key_____ Date: _____ Period: _____

Unit 3 – Atomic Structure Review

Time Line review

1. Who was the ancient Greek philosopher who first proposed the notion of the atom? Democritus
2. What was Dalton's atomic model called? Billard Ball Model
3. Who's model first introduced the concept of energy levels? Bohr
4. What were the major problems of Dalton's atomic theory? He was wrong about his first two postulates.
5. Whose model was nicked name the plum pudding model? Thomson
6. ~~What was the most popular and widely accepted model of those that came out in rapid succession?~~
7. Whose atomic model could be described as electrons embedded in a positive jelly-like substance? Thomson
8. Which experiment verified that atoms could NOT be solid and the center had a positive charge? Rutherford
9. What did Rutherford's gold foil experiment show about the atom? Positively charged nucleus
10. Rutherford's model of the atom was most similar to _Bohr_ model.
11. What did Bohr attempt to do with his model of the atom? Explain the energy levels
12. How did Bohr improve Rutherford's atomic model? Included specific energy levels
13. What atomic model(s) could account for internal structure, empty space, and matter giving off energy but not the stability of the atom? Bohr
14. What atomic models did not have empty space? Thomson
15. Who did the gold foil experiment? Rutherford
16. What did the gold foil experiment prove/verify? That atoms have a positive core, nucleus

Subatomic Particle summary

Subatomic particle	Symbol	Charge	Mass	Discovered by	Experiment/Model	Location in atom
Proton	P+	+1	1	Rutherford	Gold Foil Experiment	Inside nucleus
Electron	e-	-1	0	JJ Thomson	Plum pudding model	Outside nucleus
Neutron	n^o	0	1	Chadwick	N/a	Inside nucleus

Subatomic Particle Review

1. The smallest particle of an element that retains the chemical properties of that element is a(n) ___atom___.
2. What subatomic particle determines the identity of an element? proton
3. Where is most of the mass of the atom located? nucleus
4. What subatomic particles have an electrical charge? Electrons
5. ALL neutral atoms contain equal numbers of __protons__ and __electrons_.
6. What do we call atoms that have gained or lost electrons? ions
7. What do we call atoms of the same element that have different numbers of neutrons? isotopes
8. ~~What are atoms that have different numbers of protons?~~
9. How many protons, neutron, and electrons does U-234 have? P-92, E-92, N-142
10. ~~How many electrons would it take to equal the mass of one proton or one neutron?~~
11. What element has 21 protons and 24 neutrons? Scandium
12. An atom of potassium has 19 protons and 20 neutrons. What is its mass number? 39
13. Complete the table below using the information provided and the periodic table:

Element	Atomic #	Mass number	Protons	Neutrons	Electrons
Carbon-14	6	12	6	6	6
Tin	50	119	50	67	50
Al^{+3}	13	27	13	14	13
~~^{128}I~~	~~53~~	~~127~~	~~53~~	~~74~~	~~50~~
Iodine	9	18	9	9	9
Gadolinium	64	157	64	93	64

Average Atomic Mass

Calculate the Average atomic mass for the following elements using the information provided

1. Define: Average Atomic Mass
2. Silicon has three naturally occurring isotopes.

Isotope name	Relative Abundance
Silicon-28	92.21
Silicon-29	4.70
Silicon-30	3.09

$$\frac{(28)(92.21) + (29)(4.70) + (30)(3.09)}{100}$$

3. Iron has four isotopes.

Isotope name	Isotope abundance
Iron-54	5.90%
Iron-56	91.72%
Iron-57	2.10%
Iron-58	0.280%

$$\frac{(54)(5.90) + (56)(91.72) + (57)(2.10) + (58)(0.280)}{100}$$

4. Boron has two naturally occurring isotopes with masses of 10.0129 amu which occupies 19.91 percent and another isotope of 11.0093 amu and occupying 80.09 percent. Calculate the average atomic mass of Boron.

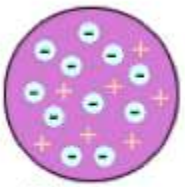
$$\frac{(10.0129\text{amu})(19.91) + (11.0093)(80.09)}{100}$$

Atomic Models Review

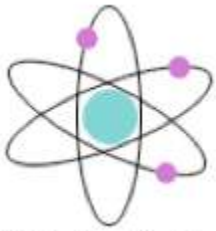
For each person listed below **draw** and **label** their atomic model, tell what the name of their model and what it **could** and **could not** account for.

Scientist/Model name	Drawing/Illustration	Could account for	Could NOT account
Dalton	See below	1) All matter is made of atoms. Atoms are indivisible and indestructible. 2) All atoms of a given element are identical in mass and properties 3) Compounds are formed by a combination of two or more different kinds of atoms. 4) A chemical reaction is a ***rearrangement*** of atoms.	1) All matter is made of atoms. Atoms are indivisible and indestructible. 2) All atoms of a given element are identical in mass and properties
JJ Thomson	See below	Discovered electrons	Stability of atom
Rutherford	See below	Discovered proton	Stability of atom
Bohr	See below	Energy levels	Continuous and discontinuous spectrum

Dalton
"Billiard Ball" Model



Thomson
"Plum Pudding" Model



Rutherford Model

Bohr Model

Quantum Mechanical
Model