Unit 3: The Atom and Nuclear Chemistry

**Learning Targets (Standards)**

**Rubric for all Learning Targets**

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| **0** **No Evidence**  | **5** **Not Yet**  | **7** **Approaching**  | **8.5** **Proficient**  | **10** **Advanced**  |
| Left 2 or more questions blank on the assessment  | No evidence of proficiency with the learning target but attempted the questions.  | Shows beginning proficiency with the learning target, but is inconsistent or makes several errors (>4 errors) | Demonstrates understanding of most or all of the learning target, but misses no more than 1 success criteria or makes 3-4 errors  | Demonstrates mastery of learning target; makes no more than 1-2 minor errors  |

**LT 3.1: Use the periodic table to identify and count subatomic particles within the atom.**

* I can use the atomic number of an element to identify protons and electrons for any element
* I can apply the relationship, “mass number = protons + neutrons,” to find protons, neutrons, or mass for any element
* I can give the nuclear symbol for an atom given protons, neutrons, and electrons AND use the nuclear symbol to find protons, neutrons, and electrons for an atom
* I can determine the number of neutrons when given the mass number, or the mass number when given the number of neutrons, for any isotope.
* I can write the hyphen notation for any isotope given protons, neutrons, and electrons AND use the hyphen notation to find protons, neutrons, and electrons for an atom.

**LT 3.2 Develop a model of an atom and explain the component parts.**

* On a model of the atom, I can identify the component parts (nucleus, electron cloud) and say what their relative volume and mass are
* I know the charge and location of the three subatomic particles in the atom (protons, neutrons, electrons)
* I can draw correct Bohr models based on the amount of protons, neutrons, and electrons an atom has
* I can identify the valence electrons in an atom from a Bohr model

**LT 3.3 Analyze data about the atom to predict its charge based on Bohr models or ratios of subatomic particles.**

* I can use the octet rule to explain why atoms become ions.
* I can determine what charge an atom is most likely to form based on the number of valence electrons.
* I can determine the charge of an ion based on the ratio of protons to electrons and label them appropriately as a cation or anion.
* I can use the relationship between protons, electrons, and charge to determine the electrons in an atom.

**LT 3.4 Identify types of radioactive decay, decay particles, and use the Law of Conservation of Mass to write decay equations.**

* I can I can explain how the ratio of protons to neutrons affects the stability of an atom’s nucleus.
* I can identify the particles and their relative strength for the four types of radioactive decay (alpha, beta, gamma, and positron emission).
* I can write decay equations for the four types of radioactive decay that show how the nucleus changes in a nuclear decay process.

**LT 3.5 Use an element’s half-life to make predictions about how the sample will change over time.**

* I can calculate the initial (starting) amount of a radioactive isotope.
* I can calculate the final (ending) amount of a radioactive isotope that has undergone decay.
* I can determine the number of half-lives a radioactive isotope underwent.
* I can determine the length of one half-life of a radioactive isotope.
* I can determine the total time a radioactive isotope has been decaying for.