

### Unit 3 – The Modern Concept of the Atom and the Periodic Table – Learning Targets

- | Beginning | Progressing              | Mastered                 |  |
|-----------|--------------------------|--------------------------|--|
| 1         | <input type="checkbox"/> | <input type="checkbox"/> | I can describe the development of the atomic theory from the beginning of Democritus, Dalton's description of atoms as small indestructible spheres of different masses, Thomson's discovery of the electron, Rutherford's discovery of the nucleus, and Bohr's theory of the energy levels for electrons.   |
| 2         | <input type="checkbox"/> | <input type="checkbox"/> | I can describe an atom in terms of a tiny nucleus which accounts for most of the mass of the atom, containing protons and neutrons, and which is surrounded by a cloud of electrons, which accounts for most of the atom's volume.   |
| 3         | <input type="checkbox"/> | <input type="checkbox"/> | I can describe and compare the three sub-atomic particles in terms of their charges and relative masses.   |
| 4         | <input type="checkbox"/> | <input type="checkbox"/> | I can equate the number of protons within an atom's nucleus with the atomic number of the atom, and determine the element's identity.  |
| 5         | <input type="checkbox"/> | <input type="checkbox"/> | I can recognize that in a neutral atom, the numbers of protons and electrons are equal.  |
| 6         | <input type="checkbox"/> | <input type="checkbox"/> | I can recognize that ions form from atoms when the atoms lose or gain electrons but never protons.   |
| 7         | <input type="checkbox"/> | <input type="checkbox"/> | I can write the atomic notation for an atom or ion, indicating the number of protons (atomic number), total number of protons and neutrons (mass number), and charge (number of electrons gained or lost).   |
| 8         | <input type="checkbox"/> | <input type="checkbox"/> | I can describe isotopes of atoms as atoms of the same element with differing numbers of neutrons.  |
| 9         | <input type="checkbox"/> | <input type="checkbox"/> | I can calculate the atomic mass of an element from the percent abundances of the element's isotopes using the weighted average technique.  |
| 10        | <input type="checkbox"/> | <input type="checkbox"/> | I can recognize that metals are found on the left side of the table, non-metals on the right, and metalloids or semi-metals along the "stair-step line" in between.  |
| 11        | <input type="checkbox"/> | <input type="checkbox"/> | I can identify families and regions of the periodic table (including being able to define and use the terms family, column, or group and period or row) including the alkali metals, alkaline earth metals, halogens, noble or inert gases, transition metals, lanthanides or rare earth metals, and the actinides or man-made radioactive metals. |
| 12        | <input type="checkbox"/> | <input type="checkbox"/> | I can describe that the contributions of many researchers, but especially of Dmitri Mendeleev, have resulted in the current form of the periodic table.  |
| 13        | <input type="checkbox"/> | <input type="checkbox"/> | I can describe that elements are ordered on the table according to the periodic law, and that elements are grouped into families based on their similarities of chemical properties.   |
| 14        | <input type="checkbox"/> | <input type="checkbox"/> | I can describe that both families and periods have predictable trends of chemical properties, including but not limited to atomic radii, ion sizes, ionization energies, electron affinities, electronegativities, metallic character, and valences or oxidation states.   |
| 15        | <input type="checkbox"/> | <input type="checkbox"/> | I can predict the charge on the ions that will be formed by atoms in the following families of elements: alkali metals, alkaline earth metals, Pnictogens, Chalcogens, and Halogens.   |
| 16        | <input type="checkbox"/> | <input type="checkbox"/> | I can predict that Noble Gases will not form ions, except under very unusual circumstances.  |