There are many lessons already created that allow students to create atomic models. The problem with those, in my opinion, when we are discussing radioactive decay (most specifically Alpha decay) is that the nucleus is merely presented as a mass of protons and neutrons They are typically glued together in the model designs. This type of modeling does not allow for the understanding of what is occurring in Alpha Decay. It is this issue that has prompted the development of this modeling activity.

Relevant Background information:

- In instruction of chemical bonding, neutrons are frequently ignored because they do not interact during ionic, covalent or Hydrogen bonding in a significant way. However, in Radioactivity, neutrons (both quantity and ratios with the protons) become a very integral part of the process.

- There are 3 primary forces that are present in a nucleus. It is the interaction of these forces that make Alpha decay possible.
    - Polarity of the protons. Therefore, they will align themselves in a specific orientation to account for the differences in polarity
    - Strong nuclear forces which are very short range but exceptionally strong
    - Electric forces. These are repulsion of the +protons from each other in the nucleus.

- It is the Strong Nuclear force that keeps small nuclei tightly bound and thus explaining why there is not frequently Alpha Decay found in lighter elements on the periodic table. Typically the +/+ repulsion does not even play a role until the protons are spread out more than the diameter of the proton. As the nucleus is bigger, the strong nuclear force weakens and the +/+ repulsion becomes more relevant. This will allow for some larger nuclei to release the Beta particle. ($^{4}_{2}He$). This Beta particle is very stable and leaves the Daughter nucleus lighter and more stable.

The purpose of the interactive model building assignment is to allow students to interact with this information to better understand the complexity of the nucleus. They need to move past the concept that the nucleus is a solid “blob” that is tightly glued together.

Part 1 simply allows the students to practice utilizing the information on the Periodic table to determine the number of protons and newtons. These nuclei will hold together well as they have in the previous model building activities using the solid ball stuck tightly together.

Part 2 Incorporates the inclusion of the +/+ repulsion and adds small springs into their models. As they continue to add the springs onto the protons, they will begin to see how the force of the clay (Strong nuclear force) is being impacted by the +/+ repulsion (the spring).The most efficient way to model this is to have at least 3 strengths of small springs. This is valid because as we expand the diameter of the nucleus, the +/+ repulsion will become stronger.

Part 3 Allows the students to make the connection between the model and the elements on the periodic table that decay utilizing primarily Alpha decay.