

Names: _____ Period: _____

Build-an-Atom

Introduction: Models of atoms allow us to learn of their structure without actually seeing one. All models have weakness. Most atomic models do not correctly scale the size of the parts with the distances they are from one another. This model will be no exception. This model will help you will learn about the parts of an atom and how altering the parts creates **ions** and **isotopes**.

Procedure:

1. With your partner, construct an oxygen atom out of the following parts. Do this on a paper towel to keep it sanitary and avoid cleanup.

Atom Key:

Proton = Marshmallow
Neutron = Coco Puff

Electron = Nerd candy
Strong nuclear force = Frosting

2. Before you can begin, you will need to tell me how many of each of the following subatomic particles you will need:

_____ Protons _____ Neutrons _____ Electrons

(+ spoonful of strong nuclear force)

3. Once you have determined what materials you need, you may build your atom. When you are certain that it is correct, have another group sign you off for accuracy. I will double check when I quiz you about your atom.

☐

Other Group Sign-Off

☐

Instructor Sign-Off

4. I will be coming around to quiz you and your partner on the following aspects of your atom. You will *each* need to be able to identify and/or describe the following parts or concepts. For particles, you will need to point the particle out and tell me its charge, relative size, and location. You will want to quiz each other before I get there, because as soon as you or your partner get one thing wrong, you will go to the end of the line on check-offs!

Check-off:

☐

Proton

☐

Neutron

☐

Electron

☐

Strong nuclear force

☐

Electrostatic attraction

☐

Difference in strength between s.n.f. and e.a.

☐

Oxygen atom ("normal" O-16)

☐

O²⁻ ion

☐

O-18 (isotope of oxygen)

Once you are done, you may eat your atom and clean up. Check the floor, please!

Questions:

1. What are some of the good things about this model of the atom? List at least three ways that this model can help you understand the structure of an atom.
2. What are the limitations of this model? List at least three ways in which this model can't show what's really going on inside an atom.
3. Why do you think Nerds were used for the electrons instead of, say, Fruity Pebbles?
4. What difference would it make if another proton was added to the nucleus of the atom you have built? Be as specific and detailed as you can.
5. Compare the amount of energy released in a nuclear reaction to the amount of energy released in a chemical reaction. (Hint: Think about what bonds or forces are being formed or broken in each type of reaction.)
6. Complete the Venn Diagram below for the subatomic particles.

