Science 9

Simulation
Building Atoms & Ions

Name: Key
Date:
Block:

Objective: Using the simulation, create atoms and ions by changing the number of subatomic particles. Understand the difference between a neutral atom and a charged ion, and which subatomic particle is added/removed to create the charge

Part I - BEFORE the Simulation:

1. What are the 3 subatomic particles? List the particle ***name*** and its ***charge***

   protons : positive (+)
   neutrons : neutral (no charge)
   electrons : negative (-)

2. What does the term "neutral" mean? Which two subatomic particles must be the same in number in a neutral atom?

   A neutral atom does not have an overall charge. In order for an atom to be neutral, it must have the same number of protons (+) and electrons (-)

Atoms are neutral, but **ions** have an overall **"net charge**." Some are more positive and some are more negative

Part II – DURING the Simulation:

Step 1 - Go to http://phet.colorado.edu/en/simulation/build-an-atom
Step 2 - Of the three options, click on "Atom"
Step 3 - Open up the "Net charge" window – leave all other options as is
Step 4 - Click and drag protons, neutrons, and electrons to build your atom/ion

boron boron

3. Build a **neutral** ~~aluminum~~ **atom**. What would you do to make an ~~aluminum~~ **ion** with a **positive (+ 3)** charge?

   A neutral boron atom has 5 protons, 6 neutrons, and 5 electrons(e^-). To make boron into an ion with a +3 charge, you remove 3e^-, making the total 2e^-

boron boron

4. Return to your **neutral** ~~aluminum~~ **atom**. What would you do to make an ~~aluminum~~ **ion** with a **negative (- 3)** charge?

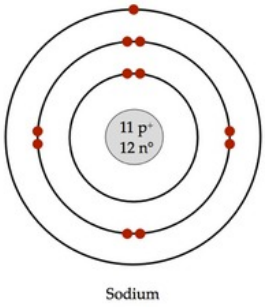
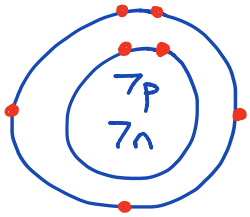
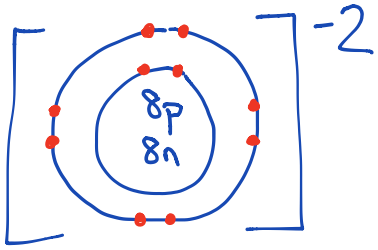
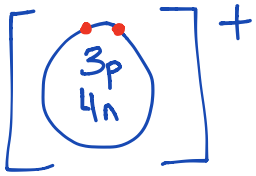
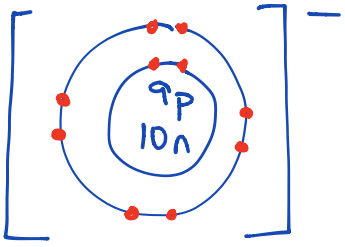
   Add 3e^-, making the total 8e^-

5. Which subatomic particle (proton, neutron, or electron) did you move in order to create a charge?

   The electrons

*You can only change the number of electrons, never the protons!

Build the atoms/ions listed using the simulation, and fill in the following table. The first atom is done as an example. Make sure that you take note of it is a **neutral atom** or a **charged ion**. For the Bohr diagrams, make sure to label the nucleus with the number of **protons and neutrons**, and to **draw the electrons in the correct energy level**

	Bohr Diagram	
Electrons: 11 Protons: 11 Charge: 0 (neutral)	 Sodium	Name: Sodium atom Symbol: Na
Electrons: 7 Protons: 7 Charge: 0		Name: Nitrogen atom Symbol: N
Electrons: 10 Protons: 8 Charge: - 2		Name: Oxygen ion Symbol: O^{-2}
Electrons: 2 Protons: 3 Charge: +1		Name: Lithium ion Symbol: Li^+
Electrons: 10 Protons: 9 Charge: – 1		Name: Fluorine ion Symbol: F^-