

# Simulation

## Building Atoms & Ions

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

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”

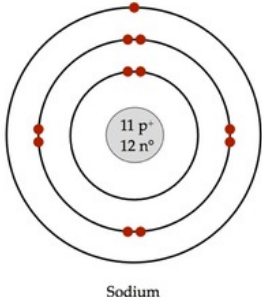
Step 3 - Open up the “Net charge” window – leave all other options as is

Step 4 - Click and drag protons, neutrons, and electrons to build your atom/ion

3. Build a **neutral boron atom**. What would you do to make a boron **ion** with a **positive (+ 3)** charge?
4. Return to your **neutral boron atom**. What would you do to make a boron **ion** with a **negative (- 3)** charge?
5. Which subatomic particle (proton, neutron, or electron) did you move in order to create a charge?

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

<p>Electrons: 11</p> <p>Protons: 11</p> <p>Charge: 0 (neutral)</p>		<p>Name: Sodium atom</p> <p>Symbol: Na</p>
<p>Electrons: 7</p> <p>Protons: 7</p> <p>Charge: 0</p>		<p>Name: Nitrogen atom</p> <p>Symbol: _____</p>
<p>Electrons: 10</p> <p>Protons: _____</p> <p>Charge: - 2</p>		<p>Name: Oxygen ion</p> <p>Symbol: O<sup>-2</sup></p>
<p>Electrons: 2</p> <p>Protons: 3</p> <p>Charge: _____</p>		<p>Name: _____</p> <p>Symbol: _____</p>
<p>Electrons: _____</p> <p>Protons: _____</p> <p>Charge: - 1</p>		<p>Name: Fluorine ion</p> <p>Symbol: F<sup>-</sup></p>