

This is my first draft of a POGIL-like activity (not yet reviewed through POGIL) using the Build An Atom sim

What is an atom?

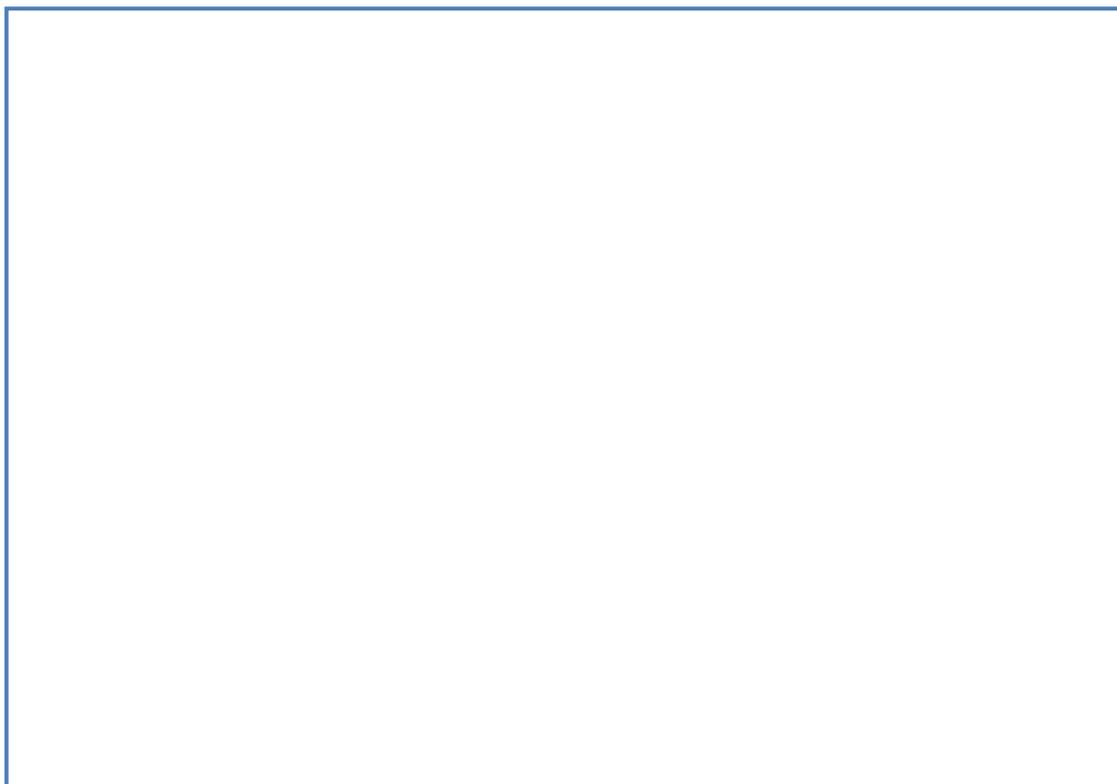
Learning Goals

- Identify the building blocks of an atom and their location in the atom structure
- Identify which atomic building blocks inform element identity, atom charge, and atom mass
- Calculate the charge on an ion
- Use an element symbol to determine the number of each building block in an atom of that element

Model 1. The Atom, Prior Knowledge

As a group, come up with a single drawing that represents a possible model for an atom. **Do not** read ahead in this exercise. **Do not** consult your book or other written resources (no Googling please!). Feel free to change the inking color to enhance your drawing below.

Group drawing/model of the atom:



PLEASE STOP HERE!

Model 2. Have the visualizer in your group open the **Build an Atom!**

<http://phet.colorado.edu/en/simulation/build-an-atom>

Click to Run, as the icon suggests. If a new web browser does not open with a simulation in it, then ask an instructor for assistance. Spend a few minutes exploring the model (feel free to play a bit!) and then, as a group, agree upon answers to the following questions:

Key Questions

1. What different kinds of “particles” do you have as building materials for an atom?
 - a)
 - b)
 - c)
2. Are you limited as to where you can put any of these “particles”? If so, briefly describe any limitations in the space below.
3. How many different uncharged (neutral) stable hydrogen atoms can you build? ____ In the space below, briefly describe the similarities and differences in their composition.
4. Which particle/particles affect the element name of the atom you build?
5. Which particle/particles are primarily responsible for the mass of the atom you build? Provide evidence from the simulation to support your answer.

6. Use the simulation to build *at least* two different atoms, each with a charge. Record information about their composition in the table below.

Element Name	Element Symbol	#protons	#neutrons	#electrons	Mass Number	Net Charge

7. Which particle/particles affect the net charge of the atom you build? Justify your answer with data from your table above.
8. In the space below, provide a general expression to clearly describe how to use your knowledge of an atom's composition to determine the sign and magnitude of its charge.
9. Find the symbol for the element nickel (abbreviated Ni) on the periodic table (either the handout or on the wall in the lecture hall). *(I may just need to give them the complete symbol here for one isotope of nickel)*
- How many electrons are in a charged atom (an ion) of Ni^{2+} ? What information did you use to determine this answer?
 - What do all nickel atoms and ions have in common? What information did you use to determine this answer?

10. In a single grammatically correct sentence, describe what your group believes is the most important point to remember from this activity.

Review Questions (take these directly from text book currently in use!)

Instructor Notes:

Invented concepts that I will need to summarize and/or give a name in a wrap up (either during or after the activity):

An atom that has a net charge is called an *ion*. An ion with a positive charge is known as a *cation*. An ion with a negative charge is known as an *anion*.

Atomic number = identifies the element = #protons in an atom

Isotopes of an element are atoms of an element that differ in their masses due to different numbers of neutrons

Not all isotopes of an element are stable! Hopefully you made some unstable atoms in simulation!

The center of an atom is where all of the protons and neutrons (the mass-responsible particles!) are located. We call this dense center of an atom a *nucleus*.