Name: _			
Period:			

"Build An Atom" Simulation – Build an Ion

Learning Goals:

- 1. Draw models that show atomic structure.
- 2. Use information about the number of protons, neutrons, and electrons to identify an element, its position on the periodic table.
- 3. Predict how changing the number protons and electrons will change the element and its charge.

Accessing Prior Knowledge:

- 1. What 2 sub-atomic particles have charges? List the particle *name* and its *charge*.
- 2. What does the term "neutral" mean?
- 3. Describe which particles and how many of each you need to make a neutral beryllium atom. (Round the atomic mass from the periodic table to the nearest whole number to get part of your answer.)

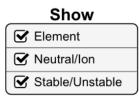
Directions:

- Go to the following website: <http://phet.colorado.edu/en/simulation/build-an-atom
- Click the green "Run Now" button below the large image to start the application.
- Play around with the simulation for a bit to become familiarize with the controls and functions. You can add particles to your atom by dragging them into the atom model. The "Element", "Mass" and "Net Charge" boxes should be expanded.
- Note that when particles are added to your model you can see if the atom is stable or unstable (labeled in the center), and if it is neutral or an ion (labeled on the outer rings). An ion means there is an overall charge to the atom.
- When you are ready to start the exercise, press the "Reset All" button in the bottom left corner to clear any changes.

Part I: Basic Electron Structure

Where are the electrons located inside of the atom?

Make sure that the simulation is set to the "orbital" model and all checked:



	The model shows two orbits, which we often call energy levels. The first energy level is the one closest to the nucleus, and the second is furthest away.
2.	How many electrons can fit in the first energy level?
3.	Can you ever have more than this number in the first energy level? Can you ever have less?
4.	How many electrons can fit in the second energy level?
5.	Build some atoms, and write down three examples that have a stable nucleus and neutral charge . This time, do not draw individual protons and neutrons, just draw one small dot for the nucleus.
	PROTON ELECTRON

Be sure to draw the electrons in the correct energy levels.

Include a drawing of your atom. The key above is a suggestion for how to draw the parts of your atom.

Picture of Atom

PICTURE OF ATOM				
Electrons:		Name:		
Protons: Charge:		Symbol:		
Electrons:		Name:		
Protons:		Symbol:		
Electrons:		Name:		
Protons:		Symbol:		

Analysis Questions:				
 From your observations, how can you predict the number of electrons in a neutral atom? Explain you answer. 				
DRAW 1 atoms you have not yet made in electrons, and only pick an element in th	•			
Part II: Making Ions				
Not all atoms are neutral. Many have a chamore negative. We call the charge on such charge".	·			
Make a neutral Beryllium atom. What wo a <i>negative</i> charge?				
Make the neutral Beryllium atom again. \ atom with a positive charge?	What would you do to make a beryllium			
 Expand the box labeled "Net Charge". Pick an element, and make two examples of the same element with DIFFERENT CHARGES in the table below. Include what the charge is (sign and number), and how many protons and electrons are in the atom. 				
Name of element:	Symbol:			
Example 1	Example 2			
Charge:	Charge:			

Example 1	Example 2
Charge:	Charge:
Electrons:	Electrons:
Protons:	Protons:

4.	What dic	l you do to change "Exc	ample 1" to "	'Example 2''?	
5.		n your observations, mak ou are given the numbe		•	e charge of the
Pa	rt III: AAak	ing Isotopes!		Teacher Signoff!	
			la a 4la a . a		liada ta a a a la a a a i a
		ns of the same element We call atoms of the sc			•
	Make	two examples OF THE S	AME ELEMEN	IT with different MA	SSES:
		Name of element: I	Hydrogen	Symbol:	
М	ASS:	Example 1Electrons:	MASS:	Example 2 _Electrons:	
Pr	otons:	Neutrons	Protons:	Neutrons:	
С	HARGE: _	P + N=	CHARGE:	P+N=	
	6. What	subatomic particle effe	cts the mass	of the same elemer	nt\$
		d on your observations, r if you are given the nun		•	the mass of the
				Teacher Signoff!	

Put it all together!

CREATE A N-14. Using all of your rules, figure out what changes for each of these actions to an atom or ion. You can test your ideas with the simulation. If you have new ideas, rewrite your rules.

Action	What Changes?	How Does it Change?
	□ Element	
Add a Proton	□ Charge	
	□ Mass	

Action	What Changes?	How Does it Change?
5	□ Element	
Remove a Neutron	□ Charge	
110011011	□ Mass	

Action	What Changes?	How Does it Change?
Remove	□ Element	
an	□ Charge	
Electron	□ Mass	

CHALLENGE:

Design a positive ion with a charge of +2:

Particles	Properties
Protons: 6 Neutrons: Electrons:	Element: Mass: Charge: Stable Nucleus: \(\text{Yes} \(\text{No} \)