



Computer Simulation Lab: Building an Atom

CLASS Set!

Directions:

1. Go to the website: <http://phet.colorado.edu/en/simulation/build-an-atom>
2. **Building an Atom:**
 - a. Click the 3 green “+” signs on the right hand side of the screen.
 - b. Answer the following questions FIRST about the atom, **Beryllium (Be)**:
 - i. How many protons are in a neutral Beryllium atom? (You can look on your P.T.)
 - ii. How many neutrons are in a neutral Beryllium atom?
 - iii. How many electrons are in a neutral Beryllium atom?
 - c. Build this atom and check that you have built Beryllium.
 - i. How many valence electrons does Beryllium have?
 - ii. What will happen to the charge if you remove the valence electrons? Check and see.
 - iii. What are charged atoms called?
 - iv. Remove one neutron. What word appears in the nucleus when you remove a neutron?
 - v. What is an atom called when the number of neutrons changes?
 - vi. What is the new mass of Beryllium?
 - vii. Look on the right hand side and write down what it says in the symbol box. Tell what each number means.
3. **Atom Stability:**
 - a. Build a different atom of your choice and answer the following questions:
 - i. What parts go in the center of the atom? What is the center called?
 - ii. Play until you discover a good rule for making the center of the atom “stable”. What seems to make the center of the atom “unstable”?
 - iii. Create a table like the one below to identify two examples – at least 1 stable and at least 1 unstable – that shows your rules **for stability** work and include a drawing of your nucleus.

	What is in your nucleus?	Draw your nucleus	Is it stable or unstable?	What <u>Element</u> is it?
1				
2				

TURN OVER →



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4. **Atom's Charge:** Play until you discover some good rules about the charge of your atom or ion.
- What is a rule for making:
 - A neutral atom which has no charge.
 - A positive ion which has positive charge?
 - A negative ion which has negative charge?
 - Create a table like the one below to identify three examples of atoms and ions (1 neutral, 1 with a positive charge, and 1 with a negative charge) that show your rules for charge and include a drawing of your atom. (**All of your examples should also have a stable nucleus.**)

	What is in your atom or ions?	Draw your atom or ion	What is the charge?	Is it a neutral atom, positive ion, or negative ion?
1	# of protons: # of neutrons: # of electrons:			
2	# of protons: # of neutrons: # of electrons:			
3	# of protons: # of neutrons: # of electrons:			

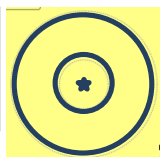
5. **Atom's mass:**
- Play until you discover some good rules about the mass of your atom or ion.
 - What is a rule for determining the mass?
6. **Summing it all Up:** Using all of your rules, figure out what changes for each of these transformations to an atom or ion. Create a table like the one below and make predictions, then test your ideas with the simulation. If you have new ideas, rewrite your rules.

Make the change:	What changes also? Element name, charge, mass?
Add a proton	
Remove a neutron	
Remove an electron	
Add an electron	

7. **Design challenges:** Try these with your partner.

Design a positive ion with a charge of +2
include a drawing:

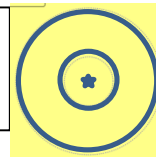
Number of protons ____
 Number of neutrons ____
 Number of electrons ____



What element is your ion? _____
 What mass is your ion? _____
 Is the nucleus of your ion stable or unstable?

Design neutral, stable atom with a mass of 8
include a drawing:

Number of protons ____
 Number of neutrons ____
 Number of electrons ____



What element is your atom? _____
 What is the charge of you atom? _____