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 three 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 Element 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.
   a. What is a rule for making:
      i. A neutral atom which has no charge.

      ii. A positive ion which has positive charge?

      iii. A negative ion which has negative charge?

   b. 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:**
   a. Play until you discover some good rules about the **mass** of your atom or ion.
      i. What is a rule for determining the mass?

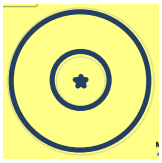
6. **Summing it all Up:** **Using all of your rules**, figure out what changes for each of these transformations to an atom or ion. Create a table like the one below and make predictions, then test your ideas with the simulation. If you have new ideas, rewrite your rules.

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:

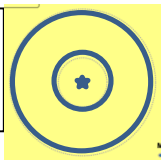
Number of protons __
Number of neutrons__
Number of electrons__



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?_____

CLASS SET!- Do not write on or take. Available online ☺