Name: Key

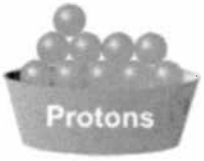

Build An Atom

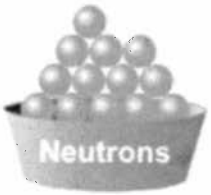
Build An Atom PhET Lab (edited Dec 2010)

Introduction: Atoms are the smallest things that retain the properties of matter we can observe.

Atoms are made of three ***subatomic*** particles; protons, neutrons, and electrons.

- Protons have a mass of 1 amu and a charge of +.
- Neutrons have a mass of 1 amu and a charge of 0.
- Electrons have a mass of nearly 0 amu and a charge of −.



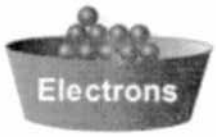


In this simulation, you will build atoms, subatomic particle by subatomic particle and observe the effect of adding more of each particle. When the subatomic particles in an atom change, an **ion**, **isotope** or different element will be created.

Procedure: *Play with the Sims → Chemistry → Build An Atom*

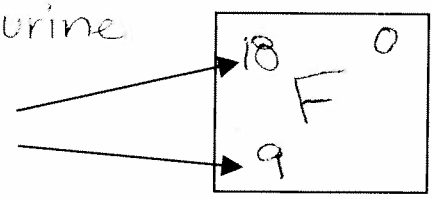
Begin by playing with the simulation for a while. Become familiar with the interface. What happens when you add protons, neutrons, or electrons? To start over, click Reset All.

Show the **symbol**, **atomic mass**, and **charge** by clicking on the ▣.



Analysis Questions

1. Ions are atoms of the same element with different numbers of e⁻.
2. Isotopes are atoms of the same element with different numbers of n.
3. Adding or removing protons from an atom does what to the atom? changes the element
4. An atom with the same number of protons and electrons has a charge of 0.
5. Adding two electrons to a neutral atom produces an ion with a charge of −2.
6. An atom with six protons and five electrons would have a charge of +1.
7. What atom is created with nine protons, nine neutrons, and nine electrons? Flourine
8. Show the full symbol for the above atom in the box at the right ⟹
9. What does the upper-left number in the symbol represent? mass #
10. What does the lower-left number in the symbol represent? atomic #



Get your build on!

Atom or Ion has	What Element is it?
# of protons: 6 # of neutrons: 6 # of electrons: 6	12 C 0 6 carbon
# of protons: 7 # of neutrons: 6 # of electrons: 6	13 N +1 7 nitrogen
# of protons: 6 # of neutrons: 7 # of electrons: 7	13 C −1 6 carbon

Using all of your rules, figure out what changes for each of these changes to an atom or ion. Copy this table 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	element name, mass, charge
Remove a neutron	mass
Remove an electron	charge (makes +)
Add an electron	charge (makes −)

Game **The Game**

With remaining class time, play a few games. Play a game at each level until you have earned a perfect score for each. Take a screen shot and paste it below. (Command + Shift + 4) It will show up on your desktop so you can drag it in.

Atom Turotial: Click on the following link (or type into your browser), and complete the interactive tutorial.

Teachers Domain: Atom Tutorial
http://www.teachersdomain.org/resource/lsps07.sci.phys.matter.theatom/

Atom Video Clip: Click on the following link (or type into your browser), and watch the interactive video clip.

BBC: Elements and Atoms Interactive Video Clip
http://www.bbc.co.uk/schools/ks3bitesize/science/chemical_material_behaviour/atoms_elements/activity.shtml

***Complete the table below after class** as homework/practice.*

Protons	Neutrons	Electrons	Atomic Number	Mass Number	Charge	Element	**Full** Symbol
4	**4**	**4**	**4**	**8**	**0**	**Be**	$^{8}_{4}Be$
5	**5**	**6**	1. 5	2. 10	3. −1	4. B	5. $^{10}_{5}B^{-1}$
8	**8**	**7**	6. 8	7. 16	8. +1	9. O	10. $^{16}_{8}O^{+1}$
11. 7	12. 6	13. 10	**7**	**13**	**-3**	14. N	15. $^{13}_{7}N^{-3}$
16. 9	17. 11	18. 10	**9**	**20**	**-1**	19. F	20. $^{20}_{9}F^{-1}$