

Science 9 Unit 3.1 KEY

Name: Key

Unit 3.1 – The Structure of An Atom  
Science 9 – Wolfe, Spring 2020

Welcome to the first activity in our Chemistry Unit! You will find as you go through the materials in the next two units that I describe things as either ESSENTIAL or ENRICHMENT. Since the year has been effectively shortened, we have had to cut out some of the material. However, it can be difficult to do a really good job in Science 10 without having everything – so I am including all of the material for those of you who want to go a little beyond what's required to make sure you are extra well prepared for next year. ESSENTIAL topics and work are required for your grade for this class; ENRICHMENT are your choice to do.

Please contact me ASAP if you will not have any internet access for this week or if you would like a paper copy of the packet to pick up at the school. You can turn this in by: submitting screenshots (at a high resolution) through the class assignment in Teams, emailing screenshots or scanned documents to me, or dropping off a hard copy at the school.

**Part 1. (Essential)**

Visit [https://phet.colorado.edu/sims/html/build-an-atom/latest/build-an-atom\\_en.html](https://phet.colorado.edu/sims/html/build-an-atom/latest/build-an-atom_en.html).

Make sure all options are checked, including “stable/unstable” and you have selected “orbits” for the model.

The simulation gives you the atomic symbol, which is a one or two letter nickname for the element, such as “H” for “hydrogen.” You may need to google “name of \_\_\_\_\_” to get the actual element from the symbol – some make sense, like hydrogen above, but some are confusing, like “Au” for “silver.”

Play around with building atoms for a few minutes, then answer the questions below:

1. Where do protons go when you drop them into the atom?

nucleus

2. Where do neutrons go when you drop them into the atom?

nucleus

3. Where do electrons go when you drop them into the atom?

Rings around the nucleus

4. Make an atom with 3 protons (and nothing else)

What is its atomic symbol? Li What is its name? Lithium

How many neutrons do you need to make it stable? 3

What's the biggest number you can have before it becomes unstable again? 4

5. Make an atom with 4 protons (and nothing else)

What is its atomic symbol? Be What is its name? Beryllium

How many neutrons do you need to make it stable? 5

What's the biggest number you can have before it becomes unstable again? 5

6. Add electrons to your Be (beryllium) atom (the one with 4 protons.) In the upper right, it should say "+ ion" to start with.

What does it say when you add 4 electrons? Neutral atom

What does it say when you add more than 4 electrons? - ion (negative)

7. What is the symbol of the "heaviest" atom you can make – you only need to worry about the nucleus, or protons and neutrons? Ne

What is its name? Neon

How many protons and neutrons can it have – and still be stable? (10-12) up to 12

How many electrons do you need to add to make it neutral? 10

## Part 2. (Essential)

There are lots of ways to model an atom. What you looked at is called the Bohr Model (after the dude who came up with it about a hundred years ago, a physicist named Niels Bohr.) It's not the only model but it's one of the most well-known. You can recognize it because it has one or more rings around the nucleus of the atom.

Watch this very brief video about the parts of an atom:

<https://www.youtube.com/watch?v=cpBb2bgFO6I>

Let's make a table showing the parts of the atom and a little bit about them. You can find the answers at <https://courses.lumenlearning.com/boundless-chemistry/chapter/the-structure-of-the-atom/>

Particle	Location	Mass (amu)	Charge
Proton	nucleus	~1	+1
Neutron	nucleus	~1	0
Electron	shells/orbitals/ outside of nucleus	~0	-1

Orbitals are concentric spheres around the nucleus – you don't know what this means yet, but basically electrons live outside the nucleus, and the more of them an atom has, the larger the atom usually is.

### Part 3. (Essential)

I am asking you to pick an atom of any element at all and build a model of it. You can build a model using such items as cotton balls, gumdrops, etc, crochet it, sculpt it, make a mobile... whatever works for you! A good place to start is just to image search "atom model" or even "atom model homemade" for lots of great ideas.

Your finished project should include:

- A 3D model of an atom
- A card or paper telling me: the name of the atom, its atomic symbol, how many protons it has, and a couple of facts about the element. For example, if you choose iron, it may look like:

Iron  
Fe  
26 protons

Iron is the most common element on Earth by mass. The earth's core is mostly iron. It is a metal and is used to make steel.