

# World of Chemcraft: Level 3 – You’re Looking Right Atom

Name: \_\_\_\_\_ Block: \_\_\_\_\_

## 3.4: The m&m Lab - Drawing and Making Atoms

**Purpose:** To use information from the periodic table to draw box and Bohr model representations of atoms.

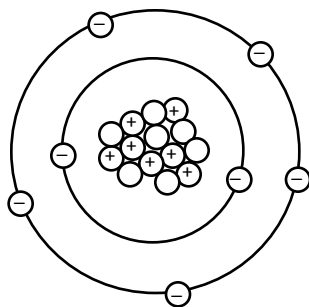
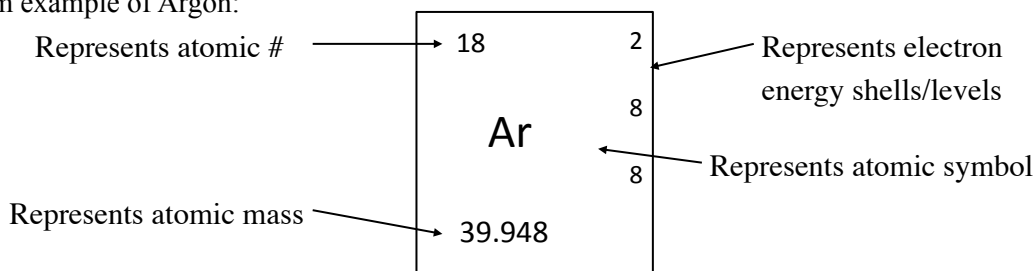
**Materials:** Periodic Table, pencil, paper, candy, blank m&m Bohr diagram

**Procedure:**

1. Use your periodic table to determine the symbol of the element, given its name.
2. Represent protons, neutrons, and electrons with m&m’s. Choose the color scheme you wish, but for this example, I’ll use red for protons, brown for neutrons, and green for electrons.
3. Arrange and place your candies on the appropriate location on the blank m&m Bohr diagram sheet.
4. So, using Argon as an example:
  - a. Argon’s symbol is Ar
  - b. The atomic number indicates the number of protons in the nucleus. It also gives the number of electrons in a neutral atom. Argon’s atomic number is 18. This means put 18 protons or red m&m’s in the center or the nucleus of the Bohr diagram.
  - c. The atomic mass gives the # of protons plus the average # of neutrons in the nucleus. (Ex: Round atomic mass to nearest number, then subtract that by the atomic number to get the number of neutrons in the nucleus.) Argon’s atomic mass is 39.948 AMU; however, this rounds up to 40 AMU. Since protons and neutrons have a mass of 1 AMU each, and since we know that Ar has 18 protons, this means that Ar has 22 neutrons ( $18 + 22 = 40$ ). Mix in 22 brown m&m’s (neutrons) into the nucleus with the 18 protons.
  - d. Since protons are positively charged particles and since Argon has 18 protons in the nucleus, it has to have 18 negatively charged particles to make a neutrally charged atom. (This is why the second sentence in (b) above is true.) So, place 18 electrons (negative) or 18 green m&m’s around the rings around the nucleus.
  - e. Remember that electrons exist in energy levels/shells around the nucleus. When working with the blank Bohr diagram sheet, note how many electrons each electron shell can hold at most (max). You are to fill the electron shells from inside (inner or first shell is the one closest to the nucleus) to outside. The 1<sup>st</sup> energy ( $e^-$ ) shell holds 2 electrons, 2<sup>nd</sup> ( $e^-$ ) shell holds 8, and 3<sup>rd</sup> ( $e^-$ ) shell holds 8.

In this lab, you will be using the information in the periodic table to create a 2-D model of what an atom looks like called the Bohr diagram (model) using m&m’s and drawings. This model shows the nucleus with the protons and neutrons, and it shows energy levels with electrons. This information can then also be transferred into the Box diagram as seen below. Use the example of Argon above and below to guide you in filling out the m&m model, box diagram, and drawing of the Bohr model for the elements listed on the next page.

Box Diagram example of Argon:



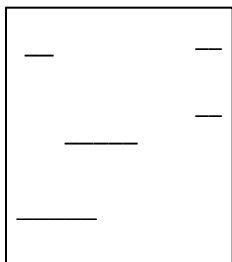
What element is this? Fill in the box with the correct information. Check your answer before moving on.

_____	_____
_____	_____
_____	_____

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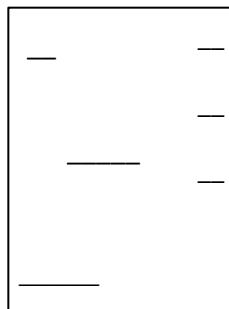
3.4:

Oxygen:



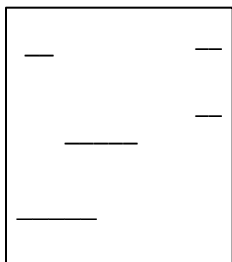
Bohr Drawing:

Magnesium:



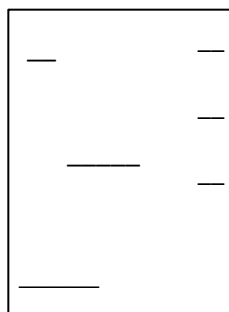
Drawing:

Carbon:

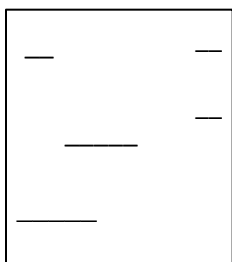


Bohr Drawing:

Sulfur:

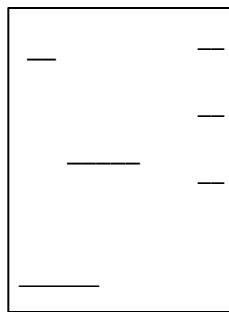


Hydrogen:

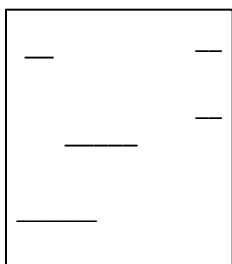


Bohr Drawing:

Sodium:



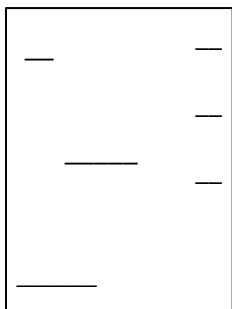
Nitrogen:



Bohr Drawing:

Extra Credit: Calcium 2+ - Draw Box & Bohr diagrams

Chlorine:



Bohr Drawing:

Ions & Atoms: If you want to see how an atom becomes positively charged, just remove one (or more) electron(s). If you want to see how an atom becomes negatively charged, just add one (or more) electrons.

[http://www.chem4kids.com/files/atom\\_ions.html](http://www.chem4kids.com/files/atom_ions.html)