

Atoms and Molecules Lab Activity – Student Edition

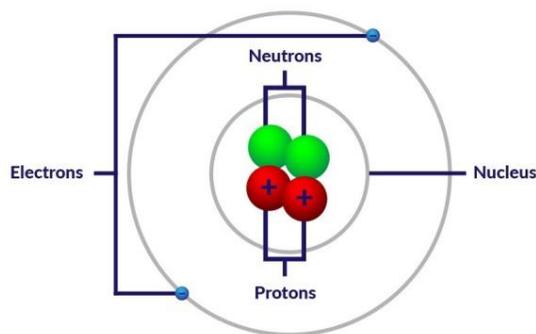


Background Information

Atoms are the smallest units of matter. They consist of a central region called the nucleus and an area surrounding the nucleus called the electron cloud.

Atoms contain three different types of subatomic particles:

- Protons have a positive charge and are found in the nucleus of the atom. These particles contribute to some of the atom's mass, the mass of 1 proton is used as a unit of measurement of mass in the super small world of atoms. 1 proton = 1 Atomic Mass Unit or AMU. All atoms of a particular element have the same number of protons. This is called the atom's atomic number and is used to identify the element. The atomic number is the top number in the element box on the periodic table.
- Neutrons are also found in the nucleus of the atom. These particles have no charge and are electrically neutral. Like protons, neutrons also contribute to the mass of an atom. The mass of 1 neutron equals 1 AMU. The combined number of protons and neutrons mass of an atom is called an atom's atomic mass. This number is the bottom number in each element box on the periodic table and is usually the larger of the two numbers.
- Electrons are the third type of subatomic particle. They are found in the electron cloud area surrounding the nucleus and are highly energetic. The amount of energy an electron possesses affects its distances from the nucleus. Electrons have a negative charge and are so small that they are not considered part of the atomic mass number of an element.



Since atoms are electrically neutral, the number of protons and the number of electrons are the same. For example, if the atom has 5 protons (5 positive charges), it will have 5 electrons (5 negative charges) to balance it out.

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In this lab activity you will construct different atoms using M&M's or similar candy and a template of the model of the atom.

Learning Objectives:

1. Describe the basic structure of the atom.
2. Distinguish between protons, neutrons, and electrons.

Safety:

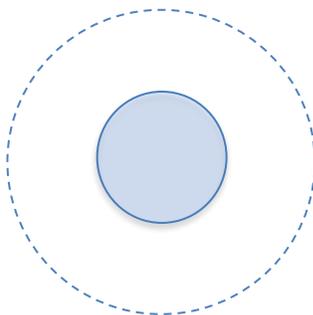
1. Wash your hands before handling candy.
2. Do not eat the candy during the lab. Your teacher will inform you if you are allowed to eat it at the end of the lab.

Pre-Lab Tasks:

1. Using the information above complete the chart below:

Particle	Proton	Neutron	Electron
Charge			
Mass			

2. Label the nucleus and the electron cloud region on the diagram below:



3. Identify the location of the protons, neutrons, and electrons on your diagram.

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Equipment:

For this lab you will need:

- A copy of the atom template from your teacher.
- A periodic table
- Plate or bowl for candy.
- M&M's or similar candy

Task 1: Building Lithium

Complete the following on the Atom Template.

1. Select a colored candy to represent the protons, neutrons, and electrons.
2. Lithium has the atomic number 3, which means that it has 3 protons and 3 electrons. Arrange the protons in the nucleus and the electrons in the electron cloud.
3. Lithium's atomic mass is 6.94, which is rounded up to 7. This means that it has 4 neutrons. These must also be placed in the nucleus.



Task 2: Build the following mystery atoms.

Using the information in the table below, build each atom with their respective number of subatomic particles. Get your teacher to check them as you complete them.

Atom	Protons	Electrons	Neutrons
1	2	2	2
2	7	7	7
3	4	4	5
4	1	0	1
5	6	6	6

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Post-Lab Questions:

Use your atom model to answer the following questions:

1. Where are the protons located in an atom? _____
2. Do protons have a charge? _____
If so, what charge? _____
3. Where are the neutrons located in an atom? _____
4. Do neutrons have a charge? _____
If so, what charge? _____
5. Where are the electrons located in an atom? _____
6. Do electrons have a charge? _____
If so, what charge? _____
7. For an atom to be neutral, 2 particles must be equal in number. Name these 2 particles. -

8. Name each of the atoms you constructed models for using the periodic table.

Atom	Atomic number	Name
1	2	
2	7	
3	4	
4	1	
5	6	