

Atoms and Molecules Lab Activity – Teacher Edition

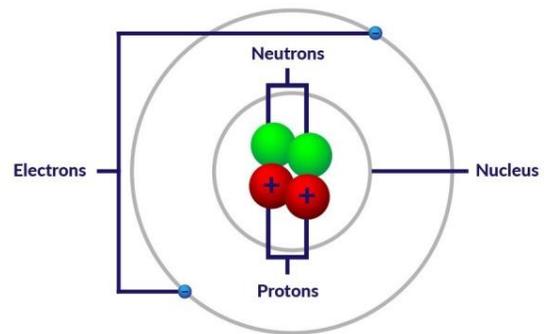


Background Information

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.

Name: _____ Period: _____ Date: _____

Atoms and Molecules Lab Activity – Teacher Edition

Additional Teacher Notes

The purpose of this lab is to construct different atoms using M&M's or similar candy and a template of the model of the atom. It provides students with an opportunity to practice locating and identifying subatomic particles and can be used as a lead in activity to teach the periodic table, atomic number, and mass number (found in lesson 3). Students are not expected to arrange electrons in any given orbital. However, brief discussion of electron repulsion and how electrons are found at varying distances from the nucleus could be included for classes which this is deemed appropriate.

Safety:

- Students should be discouraged from eating candy until the end of the lab activity.
- Counters, colored stones, or other plastic playing pieces can also be used in settings where allergies or candy is prohibited.

Group size: Pairs or individually

Time allowance: 30-45 mins

Extension Activities:

Discussion of isotopes, ions, and ionic bonding

Learning Objectives:

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

Pre-Lab Tasks: Answers

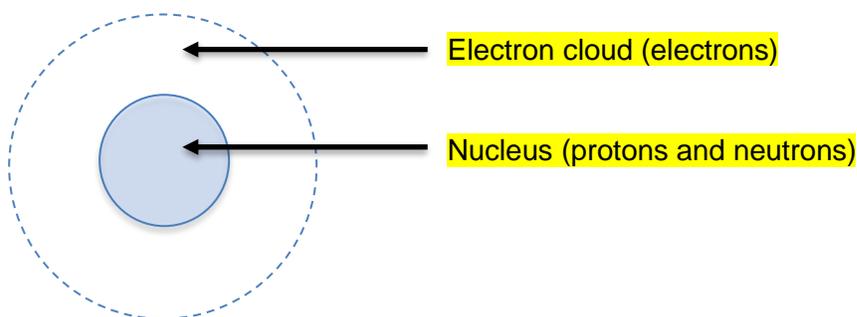
1. Using the information above complete the chart below:

Particle	Proton	Neutron	Electron
Charge	+1	No charge/zero	-1
Mass	+1	+1	Zero

Name: _____ Period: _____ Date: _____

Atoms and Molecules Lab Activity – Teacher Edition

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.

See above diagram

Equipment:

For this lab you will need:

- A copy of the atom template from your teacher.
- A plate or bowl
- A periodic table
- 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.

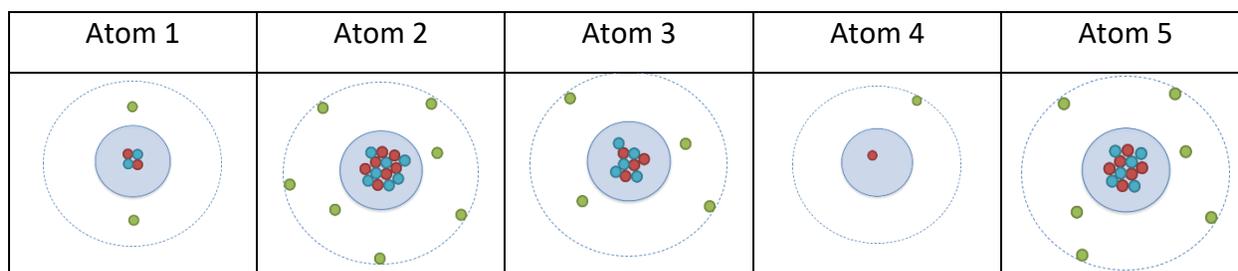


Atoms and Molecules Lab Activity – Teacher Edition

Task 2: Build the following mystery atoms.

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

Atom model answers:



Post-Lab Questions:

Use your atom model to answer the following questions:

- Where are the protons located in an atom? **Nucleus**
- Do protons have a charge? **Yes** If so, what charge? **Positive (+1)**
- Where are the neutrons located in an atom? **Nucleus**
- Do neutrons have a charge? **No**
- Where are the electrons located in an atom? **Electron cloud**
- Do electrons have a charge? **Yes** If so, what charge? **Negative (-1)**
- For an atom to be neutral, 2 particles must be equal in number. Name these particles.
Protons and electrons
- Name each of the atoms you constructed models for using the periodic table.

Atom	Atomic number	Name
1	2	Helium
2	7	Nitrogen
3	4	Beryllium
4	1	Hydrogen
5	6	Carbon