

**Atomic Structure Lab** - SPS1. Students will investigate our current understanding of the atom

- **Learning Targets Checklist:**
- Examine the structure of the atom in terms of proton, electron, and neutron locations \_\_\_\_\_
- Atomic mass and atomic number, and atoms with different numbers of neutrons (isotopes) \_\_\_\_\_
- Explain the relationship of the proton number to the element's identity \_\_\_\_\_
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**Background Info:** An \_\_\_\_\_ is the smallest piece of matter. It contains 3 subatomic particles. 2 are located in the nucleus of an atom which are \_\_\_\_\_. Protons have a \_\_\_\_\_ charge, while neutrons have a \_\_\_\_\_ charge. You add Protons + Neutrons to get the \_\_\_\_\_. The 3rd subatomic particle is called an \_\_\_\_\_ and it has a \_\_\_\_\_ charge. Electrons are located outside of the nucleus in the \_\_\_\_\_. The number of protons in an atom is the same as the \_\_\_\_\_ number. The number of protons or \_\_\_\_\_ tells the identity of an \_\_\_\_\_. Atoms with the same number of protons but a different number of neutrons are \_\_\_\_\_. Atoms with a different number of protons and electrons are called \_\_\_\_\_.

For example: Lithium  
 (Li) has two isotopes. Both isotopes have 3 protons (atomic number 3), but one has 3 neutrons and the other has 4 neutrons!

Example A: The Li isotope with 3 neutrons has a mass number of 6 ( $3p + 3n$ )

Symbol is  ${}_3^6\text{Li}$  Name is Lithium-6

Example B: The Li isotope with 4 neutrons has a mass number of 7 ( $3p + 4n$ )

Symbol is  ${}_3^7\text{Li}$  Name is Lithium-7

**Purpose:** In today's activity you will learn what an isotope is and how to write the correct symbols and names of various isotopes.

**Procedure:** Working with your partner(s), count the number of protons (Blue Beads), neutrons (Green Beads) and electrons (Yellow Beads) in each baggie and enter the data in the table below. Use your periodic table to identify the element. Following the example of lithium isotopes given above, write the symbol and name of each isotope. (DO NOT OPEN THE BAG, COUNT BEADS WITH BAG CLOSED!!!)

**Data Table:** Fill in the following data table by counting the number of protons, neutrons, and electrons.

Bag #	# of Protons	# of Neutrons	Mass Number	Atomic Number	# of Electrons	Charge	Nuclear Symbol	Isotope Name
Ex. A	3	3	6	3	3	0	${}_3^6\text{Li}$	Lithium-6
Ex. B	3	4	7	3	2	+1	${}_3^7\text{Li}$	Lithium-7
1								
2								
3								
4								
5								
6								
7								

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8								
9								
10								
11								

**Questions:**

1. What are the three main subatomic particles? \_\_\_\_\_  
Which two are in the nucleus? \_\_\_\_\_ Which is not? \_\_\_\_\_
2. What is the relationship between protons and neutrons and the mass number? \_\_\_\_\_  
\_\_\_\_\_
3. How could you determine the number of neutrons in a Carbon-14 atom? How many are there? \_\_\_\_\_
4. What is the relationship between protons and atomic number? \_\_\_\_\_  
\_\_\_\_\_
5. What is the definition of an isotope? \_\_\_\_\_
6. How do you determine if an element is an isotope? \_\_\_\_\_
7. How many hydrogen isotopes did you find?
  - a. How are they the same? \_\_\_\_\_
  - b. How are they different? \_\_\_\_\_
8. How many neutrons does  ${}_8^{17}\text{O}$  have? \_\_\_\_\_
9. What is the correct nuclear symbol for carbon-14? \_\_\_\_\_
10. What does the 35 in the name chlorine-35 represent? \_\_\_\_\_
11. Cobalt-60 is used as radiation therapy for cancer. How many protons and neutrons does cobalt-60 have? \_\_\_\_\_
12. Iodine-131 is used to detect thyroid problems. How is iodine-131 the same as iodine-126? \_\_\_\_\_
13. How is iodine-131 different from iodine-126? \_\_\_\_\_  
\_\_\_\_\_
14. What is the definition of 'Ion'? \_\_\_\_\_
15. How can you tell if an atom is an ion? \_\_\_\_\_
16. What is the charge for the following:  
Element with 6p & 6e \_\_\_\_\_ 8p & 10e \_\_\_\_ 3p & 2e \_\_\_\_\_

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