Activity 4: Atoms and Isotopes

Why?

- Atoms and isotopes are identified by the numbers of protons, electrons, and neutrons that they contain
- The number of protons, electrons, and neutrons in atoms determines the chemical properties of the elements
- A knowledge of the number of protons and electrons in an atom will help you understand how atoms combine to form molecules

Learning Objectives

- Identify the composition of atoms in terms of protons, neutrons, and electrons
- Use atomic symbols to represent different atoms and isotopes

Success criteria

- Quickly identify atomic symbols, atomic numbers, mass numbers, and number of electrons for elements

New Concepts

- proton, electron, neutron, atom, atomic nucleus, isotope, element, atomic symbol, atomic number, mass number

Vocabulary

- composition, electrical charge, subscript, superscript

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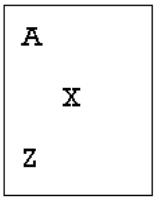
Model: Two Isotopes of Sodium

- The diagram below shows a representation of the sodium isotopes
- The proton has a charge of +1, the electron -1, and the neutron 0

Note: the diameter of an atom is about 10,000 times larger than the diameter of the atomic nucleus so the relative sizes of the atom and the nucleus are not accurately depicted.

Atomic Symbol Notation

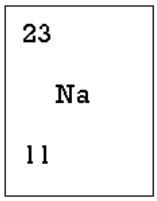


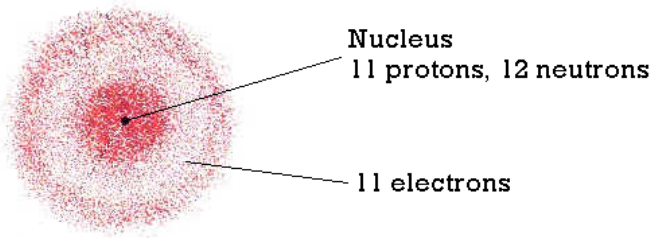
A = Mass Number

X= Atomic Symbol

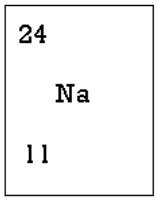
Z= Atomic Number

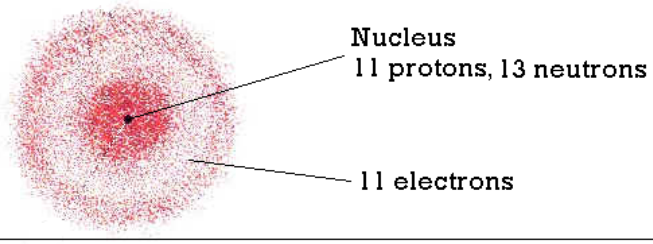
Isotope 1





Isotope 2





Key Questions:

1. What do the two sodium isotopes in the model have in common and how do they differ?_____

_____

2. How is the mass number, A, determined?

_____

_____

3. What information is provided by the atomic number, Z?

_____

_____

4. What is the relationship between the number of protons and the number of electrons in an atom?

_____

_____

5. Because of the relationship between the number of protons and the number of electrons in an atom, what is the electrical charge of an atom?

_____

_____

6. Where are the electrons, protons, and neutrons located in an atom?

_____

_____

7. Where is most of the mass located in an atom?

_____

_____

8. What do all sodium isotopes have in common that distinguishes them from atoms and isotopes of other elements?

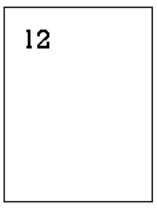
_____

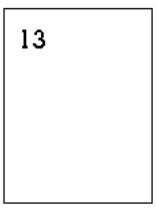
_____

Exercises

1.

(a) Write the atomic symbols for two isotopes of carbon, one with the mass number of 12 the other with the mass number of 13.





2. Fill in the missing information in the following table:

Name	Symbol	Atomic Number Z	Mass Number A	Number of Neutrons	Number of Electrons
oxygen	$^{16}_{8}O$	8	16	8	8
		7		7	
	^{34}S				
deuterium (hydrogen)		1		1	
tritium (hydrogen)		1	3		
		9	19		
beryllium			9		
		12	24		
		12	25		
			238		92
chlorine			35		
		17	37		
	Kr		84		36
		26	56		
silver				60	
				70	51
			195	117	
		79		118	

DONE!