

Atomic Structure

All atoms are composed of three types of **subatomic particles** (particles that are smaller than an atom). These particles are called protons, electrons, and neutrons.

Proton

The proton is a positively charged particle located in the nucleus of the atom. For the sake of simplicity, we define the charge on a proton to be +1.

The number of protons in an atom is equal to the **atomic number** of the element. The atomic number of each element can be found on the periodic table (see image to the right).

14	•	Atomic Number
Si	•	Symbol
Silicon	•	Name
28.1	•	Atomic Mass

$$\# \text{ of protons} = \text{atomic number}$$

Electron

The electron is a negatively charged particle that travels around the nucleus in specific paths, called **orbits** or **shells**. We define the charge on an electron to be -1.

The number of electrons in an atom is normally equal to the atomic number of the element. Because atoms contain equal numbers of protons and electrons, the atom itself is electrically neutral.

$$\# \text{ of electrons} = \text{atomic number}$$

Neutron

The neutron is a neutral (no charge) particle located in the nucleus of the atom. We define the charge on a neutron to be 0.

The number of neutrons in an atom can be determined by subtracting the atomic number of the element from the mass number of the element.

$$\# \text{ of neutrons} = \text{mass number} - \text{atomic number}$$

Mass Number

The **atomic mass** of an element is the average mass of a single atom of the element, and is measured in **atomic mass units** (amu). The atomic mass of each element can be found on the periodic table (see above).

Protons and neutrons have a mass of 1 amu, while electrons have a mass that is so small as to be effectively 0 amu.

The **mass number** of an element is simply the atomic mass, rounded off to the nearest whole number.

Summary of Subatomic Particles

Particle	Symbol and Charge	Mass	Location
proton	p^+	1 amu	nucleus
neutron	n	1 amu	nucleus
electron	e^-	0 amu	electron shell

Example 1

Determine the number of subatomic particles of each type in a gold atom.

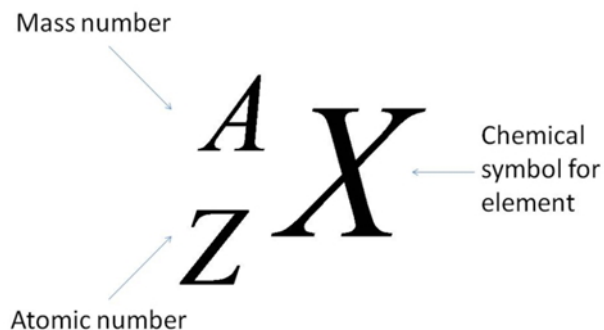
Example 2

Complete the following table.

Element	Atomic #	Mass #	Protons	Electrons	Neutrons
C					
	14				
		39			
			4		
				26	

Standard Atomic Notation

Standard atomic notation is a common notation used in chemistry and physics to indicate the atomic number and mass number of an element. It is written by writing an element symbol, preceded by a subscript indicating its atomic number and a superscript indicating its mass number, as shown in the diagram below.



Example 3

Write the standard atomic notation for carbon.

Example 4

Write the standard atomic notation for uranium.