

Name: _____ Date: _____

CHEMISTRY

Atoms, Nuclides, and Isotopes

An **atom** is the smallest pure unit of matter. All elements are made of one type of atom. The **atomic number** (Z) of the element corresponds to the **number of protons** (P) in the nuclei of all atoms for that element.

- Helium is element 2: $Z = 2$ (atomic number), therefore all atoms of Helium have 2 protons (P) in their nuclei.
- Selenium is element 34: $Z = 34$ (atomic number), therefore all atoms of Selenium have 34 protons (P) in their nuclei.

A **nuclide** is a unique atom of a given atomic mass. The **nuclide number** of an atom is the integer sum of all protons and neutrons in the nucleus. The number of protons in the nucleus is equal to the atomic number of the element. The number of neutrons in the nucleus is equal to the difference between the nuclide number and the number of protons.

$N = \text{Nuclide number} - Z$.

- 4-He: $P = 2$, $N = 4 - 2 = 2$.
- 70-Se: $P = 34$, $N = 70 - 34 = 36$

Instructions

You are given the nuclide name. Provide the other information in the table.

- Identify the element from the chemical symbol. (use the periodic table). Spell the element correctly.
- Rewrite in nuclide notation. The chemical symbol in the center. Upper left number is the nuclide number. Lower right number is the atomic number.
- Identify the atomic mass of the nucleus (A), the atomic number of the element (Z), number of protons (P), and number of neutrons (N) in the nucleus.

Nuclide Name	Element name	Nuclide Notation	A	Z	P	N
18-O	Oxygen	$^{18}_8\text{O}$	18	8	8	10
56-Fe	Iron	$^{56}_{26}\text{Fe}$	56	26	26	30

Nuclide Name	Element name	Nuclide Notation	A	Z	P	N
20-Ne						
22-Ne						
35-Cl						
37-Cl						
104-Pd						
114-Sn						
116-Sn						
123-Sb						
202-Hg						
206-Pb						