

2.1 • Atoms and Elements

THE NUCLEAR ATOM

ALL of the answers to this worksheet can be **logically** figured out by looking at the **Schematic Diagrams for Various Atoms (on the back)**, **the Periodic Table**, and **discussing** with your partners. All of the information you need is here somewhere. Determine each answer and be able to give convincing reasons for each answer.

- How many **protons** are found in ^{12}C ? ^{13}C ? $^{13}\text{C}^-$?
- How many **neutrons** are found in ^{12}C ? ^{13}C ? $^{13}\text{C}^-$?
- How many **electrons** are found in ^{12}C ? ^{13}C ? $^{13}\text{C}^-$?
- Based on the model,
 - what do all carbon atoms (and ions) have in common?
 - what do all hydrogen atoms (and ions) have in common?
- What is the significance of the atomic number, Z, above each atomic symbol in the periodic chart?
- What do all nickel (Ni) atoms have in common?
- How is the mass number, A, (left-hand superscript next to the atomic symbol) determined?
- What structural feature is different in isotopes of a particular element?
- What feature distinguishes a neutral atom from an ion?
 - How is the charge on an ion determined?
- Where is most of the mass of an atom, within the nucleus or outside of the nucleus?
Explain your reasoning.
- Complete the following table:

Isotope	Atomic Number Z	Mass Number A	Number of electrons
^{31}P	15		
^{18}O			8
	19	39	18
$^{58}\text{Ni}^{2+}$		58	

The Nuclear Atom

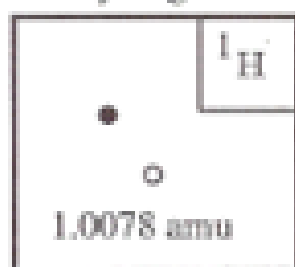
(What Is an Atom?)

Model: Schematic Diagrams for Various Atoms.

- electron (-)
- proton (+)
- neutron (no charge)

$$1 \text{ amu} = 1.6606 \times 10^{-24} \text{ g}$$

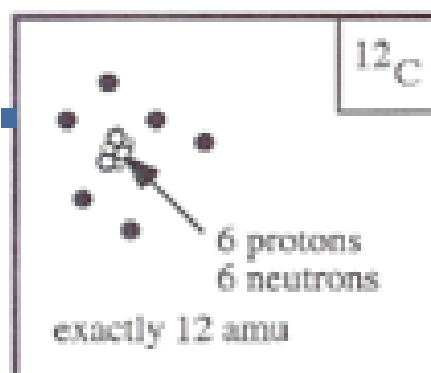
Hydrogen



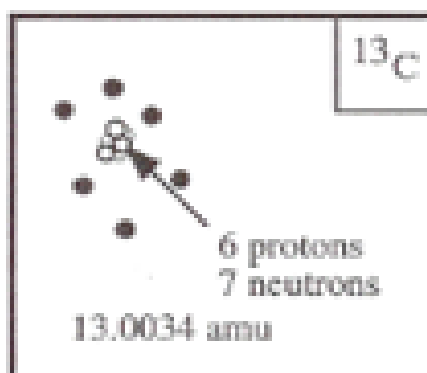
Hydrogen



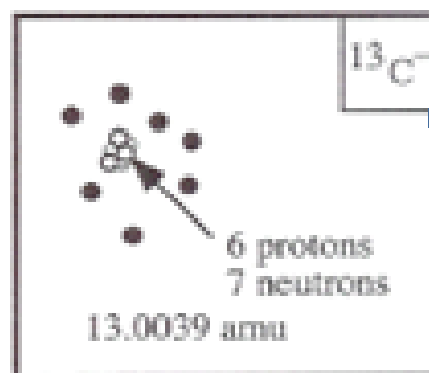
Carbon



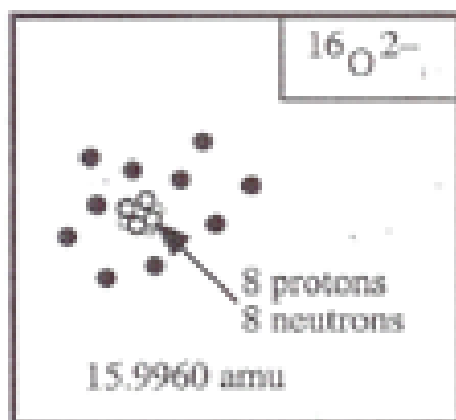
Carbon



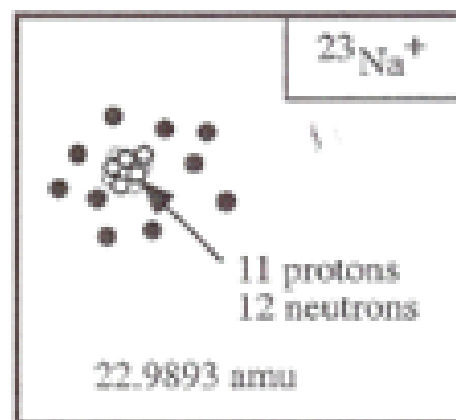
Carbon ion



Oxygen ion



Sodium ion



${}^1\text{H}$ and ${}^2\text{H}$ are isotopes of hydrogen.

${}^{12}\text{C}$ and ${}^{13}\text{C}$ are isotopes of carbon.

The nucleus of an atom contains the protons and the neutrons.