

2 • 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 , 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. Good luck.

1. How many **protons** are found in $^{12}\text{C}?$ $^{13}\text{C}?$ $^{13}\text{C}^-?$
2. How many **neutrons** are found in $^{12}\text{C}?$ $^{13}\text{C}?$ $^{13}\text{C}^-?$
3. How many **electrons** are found in $^{12}\text{C}?$ $^{13}\text{C}?$ $^{13}\text{C}^-?$
4. Based on the model,
 - a) what do all carbon atoms (and ions) have in common?
 - b) what do all hydrogen atoms (and ions) have in common?
5. What is the significance of the atomic number, Z, above each atomic symbol in the periodic chart?
6. What do all nickel (Ni) atoms have in common?
7. How is the mass number, A, (left-hand superscript next to the atomic symbol) determined?
8. What structural feature is different in isotopes of a particular element?
9.
 - a) What feature distinguishes a neutral atom from an ion?
 - b) How is the charge on an ion determined?
10. Where is most of the mass of an atom, within the nucleus or outside of the nucleus? Explain your reasoning.
11. 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	

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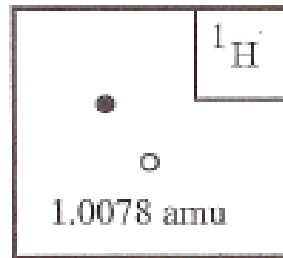
(What Is an Atom?)

Model: Schematic Diagrams for Various Atoms.

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

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

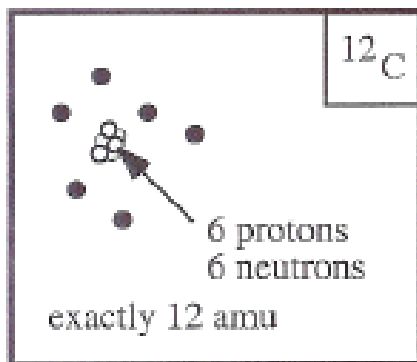
Hydrogen



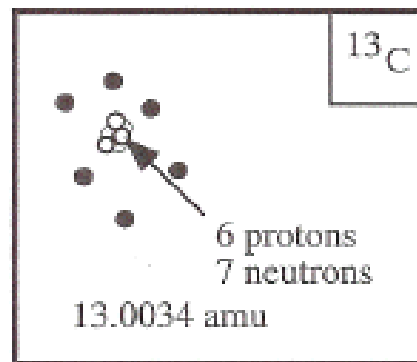
Hydrogen



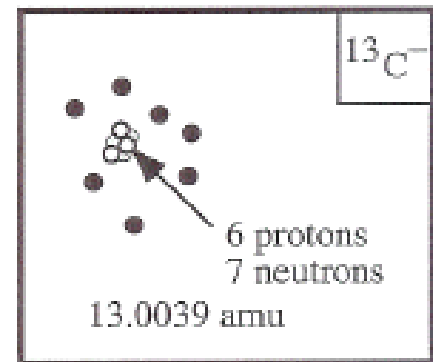
Carbon



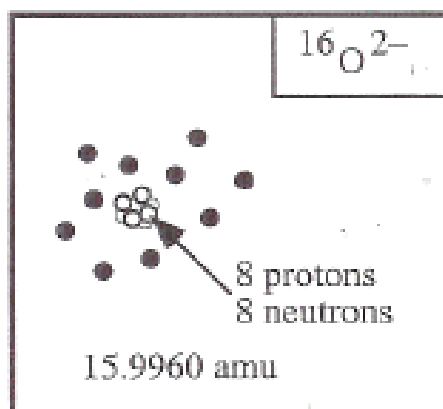
Carbon



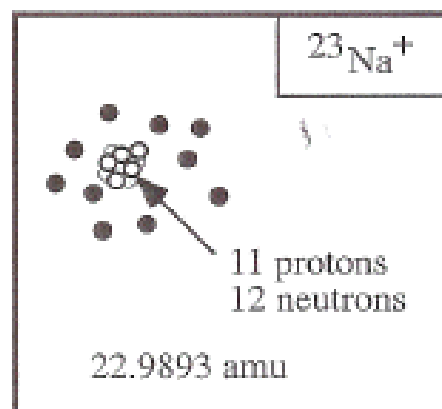
Carbon ion



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.