


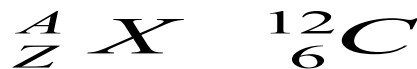


What Is an Atom?

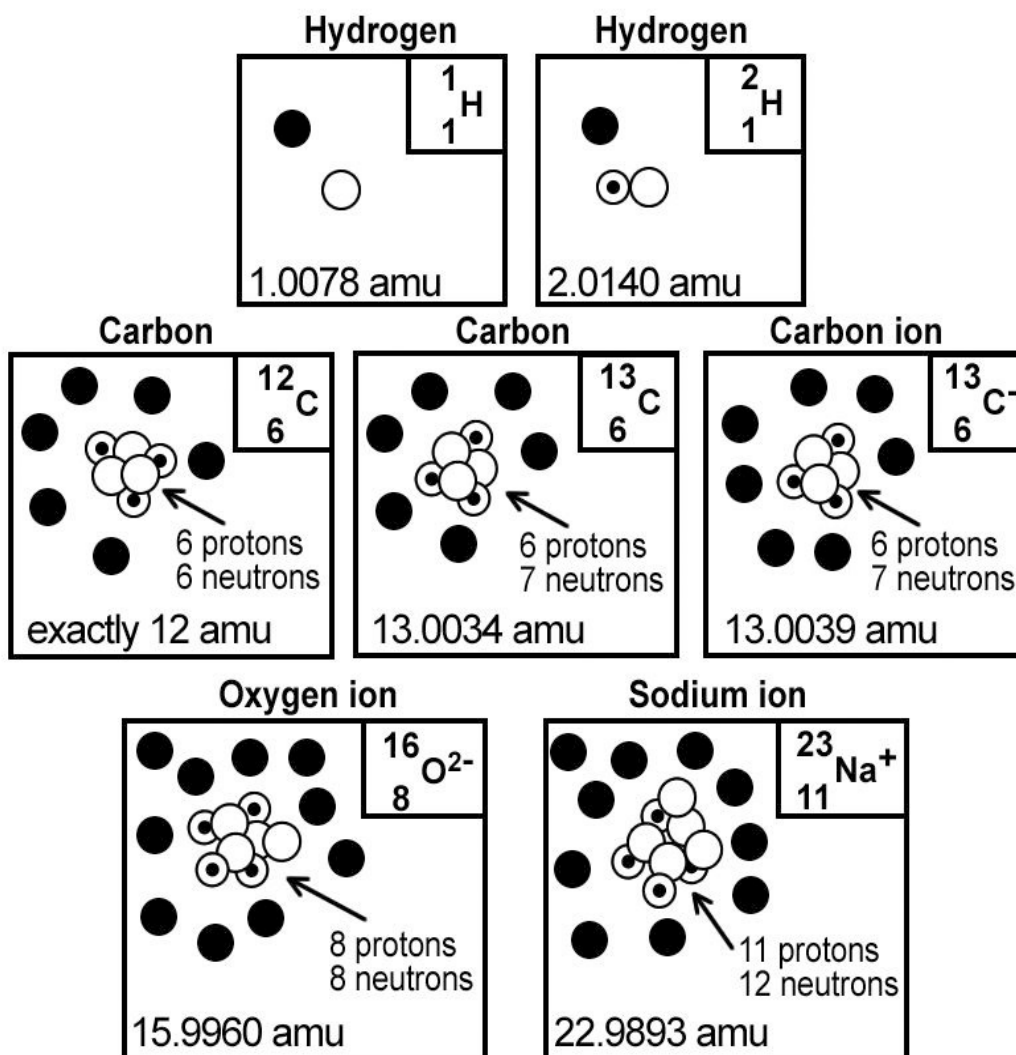
Essential Question: How would you describe subatomic particles?

Data collected from selected atoms.

	Electron (-)
	Proton (+)
	Neutron (neutral)



A is the mass number
Z the atomic number



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

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

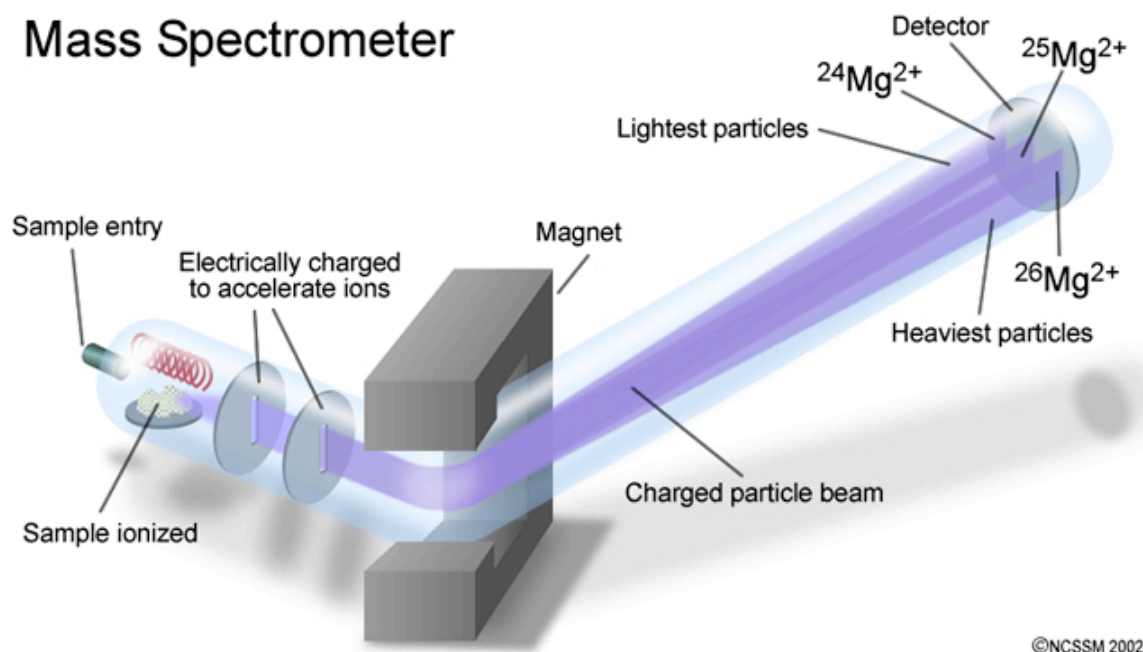
${}^{12}\text{C}$ and ${}^{13}\text{C}$ are isotopes of carbon.

An ion is a charged particle, O^{2-} and Na^+ are ions.

You can't see all the neutron and protons in the nucleus in the diagrams.

Chemists identify isotopes by using a mass spectrometer. The separation is possible because each isotope has a different mass. Lighter masses will bend more as they pass through the magnet field.

Mass Spectrometer



Critical Thinking Questions

- 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 data presented above,
 - 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 ? Where will you find it on the periodic table?
- Look at a periodic table, what do all nickel (Ni) atoms have in common?
- How is the mass number, A , determined?
- What structural feature is different in isotopes of a particular element?
- What feature distinguishes a neutral atom from an ion?

10. Where is most of the mass of an atom, within the nucleus or outside of the nucleus? Explain your reasoning.

11. Complete the chart below:

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

12. What is the mass (in amu) of

- a. one ^1H atom? _____
 b. one ^{12}C atom? _____

13. Define mass number

14. Define atomic number.

15. How many electrons, protons, and neutrons are found in each of the following?

Atom or ion	Electrons	Protons	neutrons
^{24}Mg			
$^{23}\text{Na}^+$			
^{35}Cl			
$^{35}\text{Cl}^-$			
$^{56}\text{Fe}^{3+}$			
^{15}N			
$^{16}\text{O}^{2-}$			
$^{27}\text{Al}^{3+}$			

16. Summary of Activity: Describe an atom