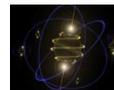


# Atomic Structure Review

Organic Chemistry  
Mrs. Dormer

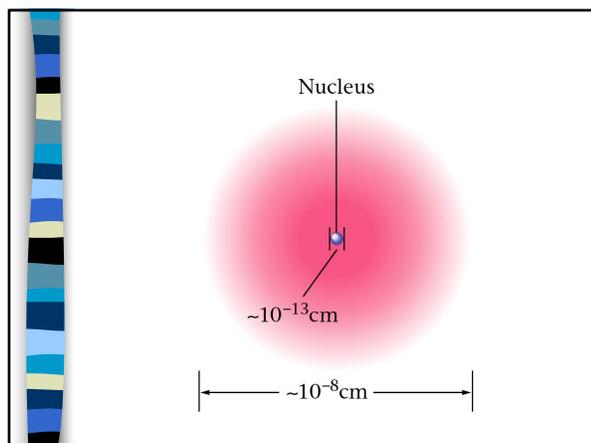


## Atoms



Although atoms of various elements differ in arrangement and the number of particles they contain, all atoms consist of 2 main regions:

- small region - nucleus which is occupied by positive charged particles - protons and neutral particles - neutrons
- surrounding nucleus is region of negatively charged particles - electrons



- Nucleus contains most of the mass of an atom, and is surrounded by the negatively charged electron cloud.

## Atomic Numbers

- Atomic Number -- the number of protons in the nucleus of each atom of that element
- Different atoms have different numbers of protons
- In periodic table, elements are arranged in order of increasing atomic number

H → 1 proton  
He → 2 protons  
Li → 3 protons

- Neutral atoms must therefore have the same number of electrons ( $e^-$ ) to balance out the protons ( $p^+$ )



## Mass Number



- **Mass Number** -- the total number of protons and neutrons in the nucleus of an isotope

	Atomic # (# of Protons)	# of Neutrons	Mass #
Protium	1	0	1+0=1
Deuterium	1	1	1+1=2
Tritium	1	2	1+2=3

## To Determine Composition

1. Find the atomic number. This is the number of protons
2. Find the mass number. This is the number of protons and neutrons.
3. Find the number of neutrons. Subtract the atomic number from the mass number.



## Writing Isotopes - Hyphen Notation

The mass number is added with a hyphen to the name of the element

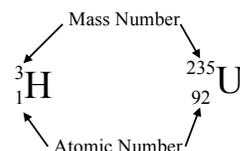
tritium is known as hydrogen-3



uranium-235

Mass  
Number

## Writing Isotopes - Nuclear Symbols



1 p<sup>+</sup>  
1 e<sup>-</sup>  
2 n<sup>0</sup>

92 p<sup>+</sup>  
92 e<sup>-</sup>  
143 n<sup>0</sup>

Chlorine - 37

p<sup>+</sup> → 17  
e<sup>-</sup> → 17  
n<sup>0</sup> → 20

Bromine - 80

p<sup>+</sup> → 35  
e<sup>-</sup> → 35  
n<sup>0</sup> → 45



## Examples

$^{13}_6\text{C}$

p<sup>+</sup> → 6  
e<sup>-</sup> → 6  
n<sup>0</sup> → 7

$^{15}_8\text{O}$

p<sup>+</sup> → 8  
e<sup>-</sup> → 8  
n<sup>0</sup> → 7



- An electrically neutral atom must have the same number of  $p^+$  and  $e^-$ . If these numbers are different, it is considered an ion.

Al = atom       $Al^{+3}$  = ion

- Atoms of the same element ALWAYS have the same number of  $p^+$ .
- Isotopes have the same number of  $p^+$ , but a different number of  $n^0$ .

## Example

- Write the symbol for a particle with  $8p^+$ ,  $8n^0$ , and  $10e^-$ .



This is an ion!

## Atomic Mass

- Atomic Mass -- average mass of all isotopes of an element.
- The atomic masses given on the periodic chart are weighted averages.