Isotopes

- atoms of an element that have the same atomic # but they have different # n^0.
  (same # p^+) (different mass #)

Ex) Hydrogen has 3 isotopes

${}^{1}_{1}H$	${}^{2}_{1}H$	${}^{3}_{1}H$
atomic # = 1	atomic # = 1	atomic # = 1
mass # = 1	mass # = 2	mass # = 3
# p^+ = 1	# p^+ = 1	# p^+ = 1
# n^0 = 1 - 1 = ∅	# n^0 = 2 - 1 = 1	# n^0 = 3 - 1 = 2
# e^- = 1	# e^- = 1	# e^- = 1
protium	deuterium	tritium

Isotopic Symbol

generic

$${}^{A}_{Z}X$$

A ← mass #

X ← element's symbol

Z ← atomic #

Ex) Practice

isotopic symbol	Z (atomic #)	A (mass #)	# p^+	# n^0	# e^-	name
${}^{59}_{27}Co$	27	59	27	59-27 = 32	27	cobalt
${}^{139}_{56}Ba$	56	56+83 139	56	83	56	barium
${}^{289}_{114}Fl$	114	289	114	289-114 175	114	flerovium
${}^{207}_{82}Pb$	82	207	82	207-82 = 125	82	lead
${}^{19}_{9}F$	9	9+10 19	9	10	9	fluorine

Atomic Mass (A.M.)

- where does the mass for an atom come from?

The p^+, n^0, & e^-

atomic mass is the weighted average mass of all the isotopes of that element

$$A.M. = (\text{mass isotope } 1 \cdot \%\text{isotope } 1) + (\text{mass isotope } 2 \cdot \%\text{isotope } 2) + (\text{mass isotope } 3 \cdot \%\text{isotope } 3) + \ldots$$

Ex) Gallium has 2 isotopes, the first has a mass of 68.925881 amu (atomic mass units) and an abundance of 60.10%. The second has a mass of 70.924705 amu and an abundance of 39.892%. Calculate the atomic mass.

$$A.M. = (68.925881 \text{ amu} \cdot .6010) + (70.924705 \text{ amu} \cdot .39892)$$