

Atomic Structure

Atom - smallest part of a substance that still retains all the properties (physical & chemical) of that substance

Inside the atom

- is mostly empty space

	location	charge	actual mass (kg)	relative mass
proton (p^+)	nucleus	+1	1.673×10^{-27}	1836 x larger
neutron (n^0)	nucleus	0	1.675×10^{-27}	1839 x larger
electron (e^-)	e^- cloud	-1	9.11×10^{-31}	1

• Atomic Number (Z) = # p^+ = # e^-

- identifies an element

- found on the PT

• mass Number (A) = # p^+ + # n^0

- not on the PT

• Isotopes - atoms of an element w/ differing # n^0 (different mass #)

Ex) Silver (Ag)

isotope 1
 $Z = 47$
 # $p^+ = 47$
 # $e^- = 47$

$A = 107$
 # $n^0 = 107$
 $- 47$
60

isotope 2
 $Z = 47$
 # $p^+ = 47$
 # $e^- = 47$

$A = 109$
 # $n^0 = 109$
 $- 47$
62

Magnesium (Mg)

isotope 1
 $Z = 12$
 $A = 24$

$p^+ = 12$
 # $e^- = 12$

$n^0 = 24$
 $- 12$
12

isotope 2
 $Z = 12$
 $A = 25$

$p^+ = 12$
 # $e^- = 12$

$n^0 = 25$
 $- 12$
13

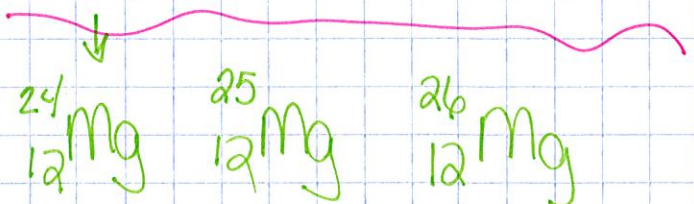
isotope 3
 $Z = 12$
 $A = 26$

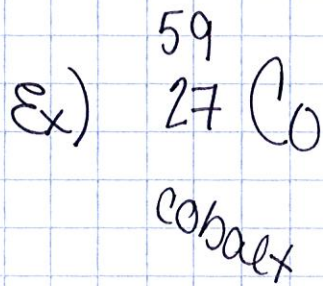
$p^+ = 12$
 # $e^- = 12$

$n^0 = 26$
 $- 12$
14

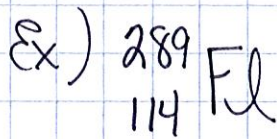
Isotopic Symbols

mass # $\leftarrow A$
 \times element symbol
 $\leftarrow Z$ atomic #

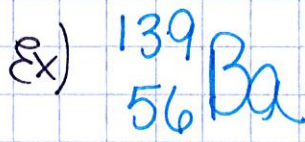




$$\begin{aligned} Z &= 27 \\ A &= 59 \\ \#p^+ &= 27 \\ \#e^- &= 27 \\ \#n^0 &= 59 - 27 = 32 \end{aligned}$$



$$\begin{aligned} Z &= 114 \\ A &= 289 \\ \#p^+ &= 114 \\ \#e^- &= 114 \\ \#n^0 &= 289 \\ &\quad - 114 \\ \hline &\quad 175 \end{aligned}$$



$$\begin{aligned} \#p^+ &= 56 \\ \#e^- &= 56 \\ \#n^0 &= 83 \end{aligned}$$



$$\begin{aligned} \#p^+ &= 98 \\ \#n^0 &= 152 \end{aligned}$$