

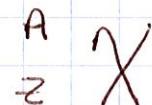
Atomic Structure

- Atoms are very tiny & cannot be broken down chemically
- mostly empty space, surrounding a very dense, super tiny nucleus
- Subatomic Particles

	mass (kg)	Relative Size	charge
Proton (p^+)	1.673×10^{-27}	$1836 \times$'s bigger	+1
Neutron (n^0)	1.675×10^{-27}	$1839 \times$'s bigger	0
Electron (e^-)	9.11×10^{-31}	1	-1

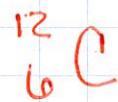
- Atomic Number (Z)
= # protons → identifies an element
= # electrons → determines reactivity of an element
- mass Number (A)
= # protons + # neutrons
- Isotopes - atoms of an element (same # protons) with different mass # (different # neutrons)

- Isotopic symbol

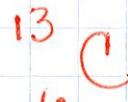


- each isotope of an element exists to differing %.

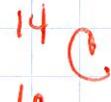
Ex) Carbon - has 3 isotopes



98.93%



1.07%



<.01% - abundances

Ex) Titanium - has 5 isotopes

$^{46}_{22}\text{Ti}$	$^{47}_{22}\text{Ti}$	$^{48}_{22}\text{Ti}$	$^{49}_{22}\text{Ti}$	$^{50}_{22}\text{Ti}$
8.25%	7.44%	73.72%	5.41%	5.18%

- Atomic mass - weighted average of all the masses of each isotope of the element

unit is

atomic mass units (amu)

(rounded to a whole number, the atomic mass may be used as the mass # of the most common isotope for that element.)

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

Ex) The element boron, B, has two isotopes. ^{10}B has a mass of 10.012937 amu and an abundance of 19.90%. ^{11}B has a mass of 11.009305 amu and an abundance of 80.10%. Calculate the atomic mass of boron.

$$\text{A.M.} = (10.012937 \text{amu} \cdot .1990) + (11.009305 \text{amu} \cdot .8010) \\ = 10.81 \text{amu}$$

Ex) calculate the atomic mass of tungsten (W), which has five isotopes whose information is listed below:

isotope	mass (amu)	abundance
^{180}W	179.946706	.12%
^{182}W	181.948206	26.50%
^{183}W	182.950224	14.31%
^{184}W	183.950933	30.64%
^{186}W	185.954362	28.43%

$$\begin{aligned} \text{A.M.} = & (179.946706 \cdot .0012) + \\ & (181.948206 \cdot .2650) + \\ & (182.950224 \cdot .1431) + \\ & (183.950933 \cdot .3064) + \\ & (185.954362 \cdot .2843) \\ = & 183.84 \text{ amu} \end{aligned}$$