Units 1-2

- Types of matter
- Isotopes
- Ions
- Quantum Mechanical Model
- Electron configurations
- Naming Ionic Compounds
- Naming Molecular Compounds
- Empirical and Theoretical Properties of Acids/Bases

C

C, O_2, P_4, S_8

O_2, H_2O, K_3PO_4

H_2O, K_3PO_4

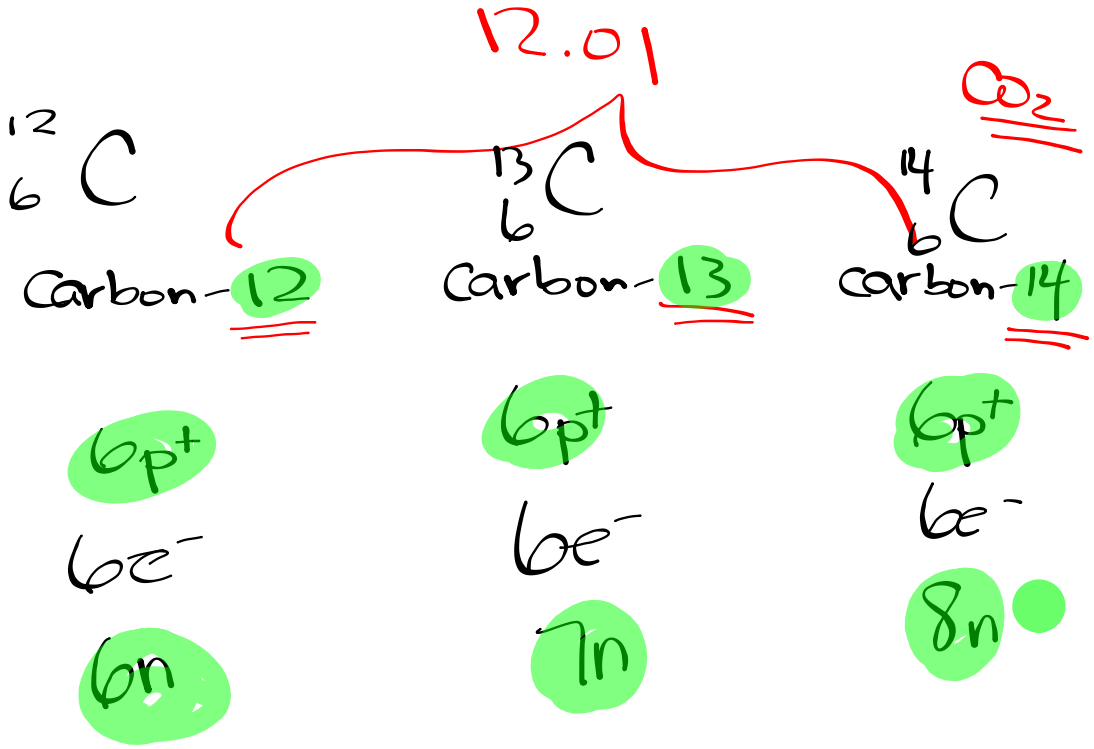
$Ca(OH)_2$ ✓

$CaOH_2$

$CaOH$

$$C = \frac{n}{V}$$

Isotope Name	Atomic Number	Mass Number	Symbol	# of Protons	# of Neutrons
carbon-13					
			^{56}Fe		
				9	11
	15	33			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CO_2
$^{12}_{6}C$
$^{13}_{6}C$
$^{14}_{6}C$
Carbon-12
Carbon-13
Carbon-14
6p+
6e-
6n
6p+
6e-
7n
6p+
6e-
8n

		+	−
Name	**Symbol**	**Protons**	**Electrons**
Calcium ion	Ca^{2+}	20	18
fluoride ion	F^-	9	10
Copper ion	Cu^+	**29**	**28**
		16	**18**

Binary Ionic Compounds - Polyatomic

$LiNO_3$

$Li^+ NO_3^-$ lithium nitrate

sodium sulfate

$CuCl$

$Cu^{+}\ Cl^{-}$ copper(I) chloride

Molecular Compounds

N_2O_5 dinitrogen pentoxide

Quantum Mechanical Model of an Atom

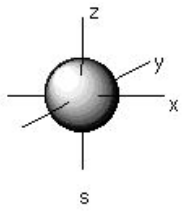
The quantum mechanical model determines the allowed energies an electron can have and how likely it is to find the electron in various locations around the nucleus.

atomic orbital - region of space in which there is a high probability to find an electron

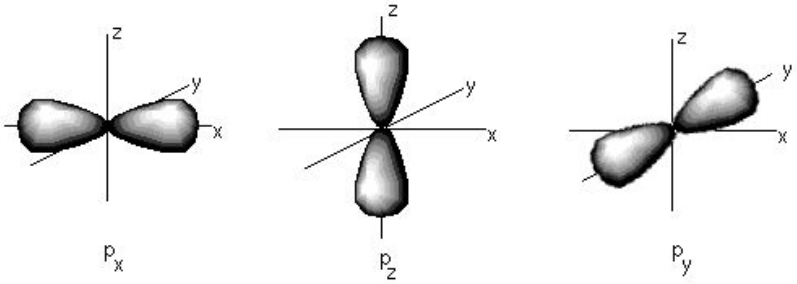
Principal quantum numbers (**n**) represent energy levels of electrons (i.e., n = 1, 2, 3, 4, etc.)

There may be several orbitals with different shapes at different energy levels.

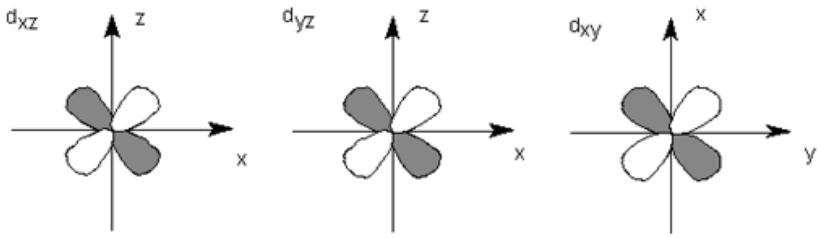
s orbital

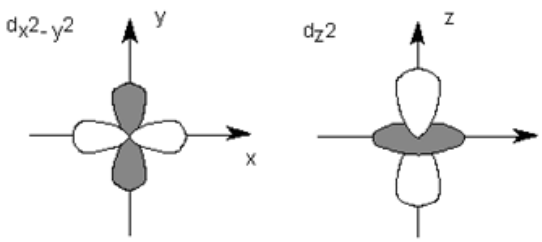


p orbitals

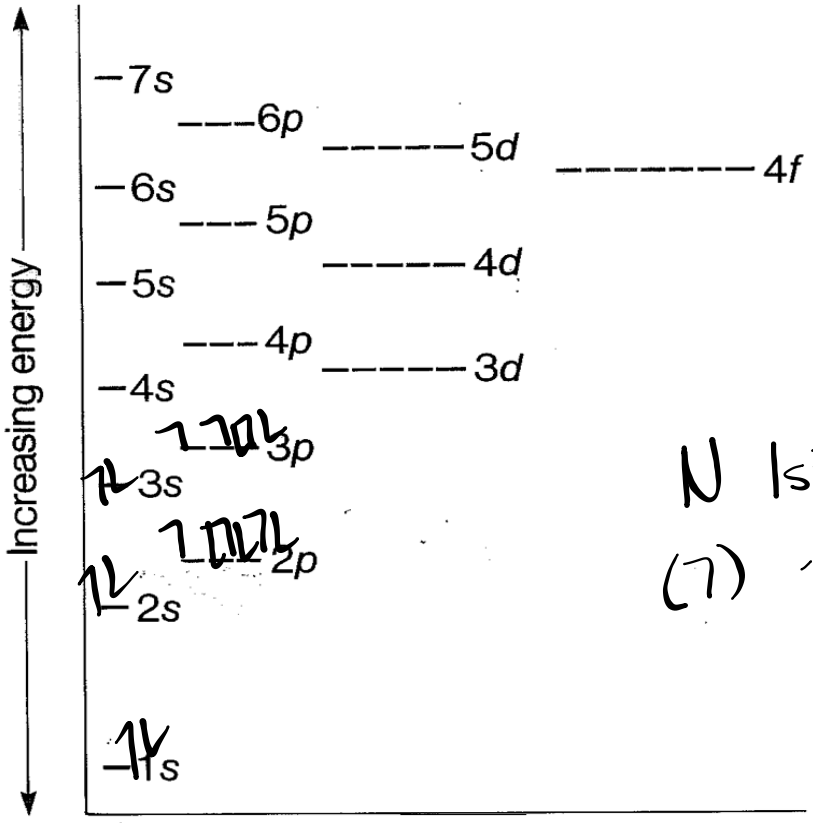


d orbitals





Aufbau Diagram



N $1s^2 2s^2 2p^3$

(7)

Aufbau principle - electrons occupy orbitals of lowest energy first

Pauli exclusion principle- an atomic orbital can describe at most two electrons

Hund's rule - one electron enters each orbital until all orbitals contain one electron with the same spin

Ionic Hydrates

$Ca(NO_3)_2 \ 3H_2O$

Ca^{2+} NO_3^-

calcium nitrate trihydrate

" " - 3-water

Binary Ionic Compounds - Type I

$CaCl_2$

Ca^{2+} Cl^- Calcium chloride

sodium oxide