Chemistry Exam 2: Unit 5 Cheat Sheet

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Preferential Bonding

*Note: all elements in the first two periods (rows) on the periodic table can NOT have an expanded octet

H - doesn't have preferential bonding because it can only bond one way (only has one bond)

C - atoms with 4 valence electrons, like carbon, can bond in 4 ways

N - atoms with 5 valence electrons, like nitrogen, can bond in 3 ways (3 total bonds and one lone pair - in any configuration)

O - atoms with 6 valence electrons, like oxygen, can bond in two ways (double bond with two lone pairs, or two single bonds and two lone pairs)

Halogens (F, Cl, Br, I) - halogens prefer to have one bond and 3 lone pairs. **F** can NEVER have more than one bond. **Cl, Br, and I** can have expanded octets, so they have more options for bonding.

Naming Covalent Compounds

Rules:

1. Name the first nonmetal by it's element name
2. Name the second nonmetal using the suffix -ide
3. Add prefixes to indicate the number of atoms of each element

only use prefixes for covalent compounds

Identifying Central Atoms

Central atom - atom that is bound to **two or more** other atoms

C - prefers to be central all the time

N - prefers to be central sometimes

O - can be central or not central

F and H - never central because they can only have one bond each

Covalent Compound Examples

NO2	Nitrogen Dioxide
CO	Carbon monoxide
N2O4	Dinitrogen Tetroxide
SiF4	Silicon Tetrafluoride
P2O5	Diphosphorus Pentoxide
SiO2	Silicon Dioxide
N2O3	Dinitrogen Trioxide

Prefixes

Mono	1
Di	2
Tri	3
Tetra	4
Penta	5
Hexa	6
Hepta	7
Octa	8
Nona	9
Deca	10

Polyatomic Ions

Octet Rule

main group atoms tend to form chemical bonds to achieve eight electrons in their valence shell, making them as stable as noble gases

Exceptions to the Octet Rule

Less e- than an octet	Ex. - Boron (3 ve-), He, Li, H
More e- than an octet (expanded octet)	Ex. - Sulfur and Phospohorus: 8, 10, or 12 ve- octet)

Polyatomic Ions	a group of two or more atoms covalently bonded together that carries an overall net electric charge (positive or negative)
Polyatomic Cation	covalent molecule with an overall **positive** charge
Polyatomic Anion	covalent molecule with an overall negative charge
Examples:	
H_3O+	Hydronium ion
NH_4+	Ammonium ion
SO_4^{-2}	Sulfate
Suffixes:	
- ate (most common suffix)	ion with **more** oxygen atoms
- ite	ion with **less** oxygen atoms
Examples:	
NO_3^-	Nit**rate** (3 oxygen atoms)
NO_2^-	Nit**rite** (2 oxygen atoms)