Foundations of Chemistry Unit: Review of Ionic and Covalent Compound Naming

There are two main types of compounds

i) IONIC compounds:

- atoms lose or gain valence electrons.
- The ions created remain bonded together due to the exchange of electrons.
- Always combines a Metal and a Nonmetal element.
- Naming ionic compounds:
  - Name the metal first followed by the non-metal with an 'ide' ending
    - NaCl – sodium chlor**ide**
- Metals that can have more than one charge are called **multivalent metals** E.g., lead can form a +2 or +4 cation
  - Pb (II) or Pb (IV)
- To name polyatomic compounds: we name the metal first, followed by the polyatomic ion name
  - $NaNO_3$ - **sodium nitrate**

ii) COVALENT or MOLECULAR compounds:

- atoms share valence electrons.
- The atoms remain bonded together due to the shared electrons.
- Always combines two Nonmetal elements (binary).
- Naming molecular compounds:
  - Remove the ending of the second element, and add "ide" just like in ionic compounds.
  - When naming molecular compounds prefixes are used to dictate the number of a given element present in the compound. If there is only one of the first element, you can drop the prefix. For example, CO is carbon monoxide, not monocarbon monoxide.
  - If there are two vowels in a row that sound the same once the prefix is added (they "conflict"), the extra vowel on the end of the prefix is removed. For example, one oxygen would be monooxide, but instead it's monoxide. The extra o is dropped

1 – mono
2 – di
3 – tri
4 – tetra
5 – penta
6 – hexa
7 – hepta
8 – octa
9 – nona
10 - deca

Naming Ionic Compounds

ELEMENTS	POSITIVE ION (Cation)	NEGATIVE ION (Anion)	COMPOUND FORMULA	NAME
Sodium & Chlorine				
Magnesium & Oxygen				
Potassium & Sulfur				
Iron (III) & Oxygen				
Silver & Phosphorus				
Copper (II) & Bromine				
Tungsten & Hydrogen				
Hydrogen & Oxygen				
Nickel (III) & Sulfur				
Calcium & Phosphorus				
Zinc & Chlorine				
Calcium & Chlorine				
Aluminum & Oxygen				
Iron (II) Bromine				

Naming Polyatomic Compounds

ELEMENTS	POSITIVE ION (cation)	NEGATIVE ION (anion)	COMPOUND FORMULA	NAME
Sodium & Carbonate				
Magnesium & Hydroxide				
Calcium & Sulfate				
Nickel (III) & Sulfate				
Copper (II) & Nitrate				
Ammonium & Chlorine				
Ammonium & Hydroxide				
Iron (III) & Sulfate				
Potassium & Chromate				
Silver & Nitrate				

Naming Covalent (Molecular) Compounds:

#	prefix
1	mono
2	di
3	tri
4	tetra
5	penta
6	hexa
7	hepta
8	octa
9	nona
10	deca

Complete the chart:

Formula	Compound Name
CO	
CO_2	
	Phosphorus trifluoride
	Diphosphorus pentafluoride
H_2O	
	Dinitrogen tetroxide

Part A: Name the following covalent compounds.

1. CO _____
2. CO_2 _____
3. N_2O_3 _____
4. N_2 _____
5. NP _____
6. SCl_2 _____
7. P_2O_5 _____
8. NBr_3 _____
9. Cl_4 _____
10. CCl_4 _____
11. PF_5 _____
12. PF_3 _____
13. OS _____
14. SeF_2 _____
15. $TeBr_2$ _____
16. P_2S_5 _____
17. C_3N_4 _____
18. F_2 _____
19. CH_4 _____
20. PH_3 _____

Part B: Write the Chemical Formula for each of the following compounds.

1. carbon tetrafluoride _____
2. silicon dioxide _____
3. dinitrogen trisulfide _____
4. phosphorus mononitride _____
5. hydrogen gas _____
6. carbon disulfide _____
7. nitrogen trichloride _____
8. silicon tetrabromide _____
9. carbon dioxide _____
10. nitrogen trifluoride _____
11. boron trisulfide _____
12. sulphur trioxide _____
13. selenium tetrafluoride _____
14. diphosphorus pentasulfide _____
15. xenon tetrafluoride _____
16. sulfur dibromide _____
17. carbon tetrachloride _____
18. oxygen gas _____
19. fluorine gas _____
20. dinitrogen tetroxide _____