

Naming and determining the formula of ionic compounds

Naming ionic compounds

- For monoatomic anions only
- drop the ending and add "-ide"
- so F⁻
- fluoride
- Cl⁻, O²⁻, C⁴⁻
- chloride, oxide and carbide

Continuing...

- cations keep the name of the element.
- When naming compounds always name the positive (cation) first and the negative (anion) last.
- so mixing ions of chlorine and sodium give you
 - sodium chloride
 - (positive) (negative)

Determining the formula of ions

- Ionic compounds are neutral
- You need to find the lowest number of each ion to make it neutral
- for example:
- Na⁺ and O²⁻
- 2 sodium for every one oxygen
- Na₂O

More examples

- Al³⁺ and O²⁻
- Al₂O₃
- K⁺ and Cl⁻
- KCl
- the subscripts don't affect the name if there is only one possibility
- still (cation)(anion)
- Aluminum oxide
- Potassium chloride

Several atoms can form a couple of different ions.

- These are all metals that aren't in group 1, 2 or aluminum.
- for example iron can form Fe²⁺ or Fe³⁺
- These are said as iron (II) and iron (III)
- Cu⁺ and Cu²⁺ is Copper (I) and Copper (II)

• 1 I	6 VI
• 2 II	7 VII
• 3 III	8 VIII
• 4 IV	9 IX
• 5 V	10 X

Figuring out charge on these elements

- If the ion is named, the charge is the roman numeral.
- If you have the formula, use the charges of the other ions present to determine the charge.
- Remember
- Halogens 1-, oxygen group 2-, nitrogen group 3-, carbon 4-

Examples

- Copper (II) chloride
- CuCl₂
- Cobalt (III) sulfide
- Co₂S₃
- NiF₂
- Nickel (II) fluoride
- Ag₂S
- Silver (I) sulfide

Polyatomic ions

- Polyatomic ions- many atoms in one ion
- You can NOT break these apart in this section.
- the "ide" suffix only applies to monoatomic anions

Common polyatomic ions

Ammonium	NH_4^+	Perchlorate	ClO_4^-	Sulfate	SO_4^{2-}
Acetate	CH_3COO^-	Chlorate	ClO_3^-	Sulfite	SO_3^{2-}
Nitrate	NO_3^-	Chlorite	ClO_2^-	Carbonate	CO_3^{2-}
Nitrite	NO_2^-	Hypochlorite	ClO^-	Dichromate	$\text{Cr}_2\text{O}_7^{2-}$
Cyanide	CN^-	Iodate	IO_3^-	Chromate	CrO_4^{2-}
Thiocyanate	SCN^-	Bromate	BrO_3^-	Oxalate	$\text{C}_2\text{O}_4^{2-}$
Hydrogen Carbonate	HCO_3^-	Hydroxide	OH^-	Silicate	SiO_3^{2-}
Hydrogen Sulfate	HSO_4^-	Permanganate	MnO_4^-	Phosphate	PO_4^{3-}
Hydrogen Sulfite	HSO_3^-	Manganate	MnO_4^{2-}	Arsenate	AsO_4^{3-}

Don't worry you don't have to memorize them!!

- They are given to you for tests.
- You will however have to be able to recognize them with the list.
- You have to look at polyatomic ions like they are one thing.
- Don't alter their formula in anyway

Determining the formula of ions

- Ionic compounds are neutral
- Remember-- you cannot break a polyatomic ion apart
- for example: Ammonium carbonate
- NH_4^+ and CO_3^{2-}
- $(\text{NH}_4)_2\text{CO}_3$

Do the following problems

- Iron (III) sulfate
- Chromium (IV) chlorate
- $\text{Sc}(\text{CH}_3\text{COO})_3$
- $\text{Mn}(\text{C}_2\text{O}_4)_3$