

NOMENCLATURE

Nomenclature is the process of naming a compound or molecule.

I. Ionic Compounds

The name of the compound consists of the name of the metal followed by the -ide form of the non-metal.

Ex. NaCl sodium chloride Ca(C₂H₃O₂)₂ calcium acetate
 MgO magnesium oxide

Practice: Name the following compounds.

- | | |
|--|--------------------------------|
| 1. CaO _____ | 4. BaCl ₂ _____ |
| 2. Al ₂ (CO ₃) ₃ _____ | 5. Na(MnO ₄) _____ |
| 3. (NH ₄) ₂ SO ₄ _____ | 6. FeS _____ |

Practice: Write the formula for the following compounds.

- | | |
|--------------------------------|---------------------------|
| 1. Potassium bicarbonate _____ | 4. Ammonium nitrate _____ |
| 2. Zinc acetate _____ | 5. Zinc phosphate _____ |
| 3. Silver dichromate _____ | 6. Lithium chloride _____ |

II. Compounds Having Metals with more than one Oxidation State

The compound is written as normal with the oxidation number in Roman Numerals in parentheses after the name of the metal.

Ex. FeCl₂ Iron (II) chloride Cl = -1 so then Fe = +2, written Iron (II)
 FeCl₃ Iron (III) chloride Cl = -1 so then Fe = +3, written Iron (III)
 CrO₂ Chromium (IV) oxide O = -2 so then Cr = +4, written Chromium (IV)
 CrO₃ Chromium (VI) oxide O = -2 so then Cr = +6, written Chromium (VI)

An alternate method uses the Latin and Greek names of the metals. Add -ous to the lower charge and -ic to the higher charge. - We will not use this method, but most of the world does!

Ex. FeCl₂ Ferrous chloride
 FeCl₃ Ferric chloride

-ide
 IA IIA IIIA IVA VA VIA VIIA VIIIA
 1+ 2+ 3+ 4+ 5- 6- 7- 8-
 4-

Reminders about Polyatomic Ions

Rule: The prefix per- denotes the greatest number of oxygen (if more than two forms). The suffix -ate denotes the most oxygen.*** The suffix -ite denotes fewer oxygen. The prefix hypo- denotes the least number of oxygen.	Ex. ClO ₄ perchlorate ClO ₃ chlorate ***the one we memorize ClO ₂ chlorite ClO hypochlorite
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Hmwk - Qs 26-59
 Study for polyatomic

Practice: Name the following compounds.

- | | |
|--|--|
| 1. Fe(OH) ₃ <u>iron (III) hydroxide</u> | 4. Cr(C ₂ H ₃ O ₂) ₂ <u>chromium (II) acetate</u> |
| 2. Cu ₂ (SO ₄) ₂ <u>copper (I) sulfate</u> | 5. FeS <u>iron (II) sulfide</u> |
| 3. Pb(NO ₃) ₂ <u>lead (II) nitrate</u> | 6. Pb(SO ₄) <u>lead (II) sulfate</u> |

Practice: Write the formula for the following compounds.

- | | |
|--|--|
| 1. Iron (II) oxide <u>Fe₂O₃</u> | 4. Copper (II) hydroxide <u>Cu(OH)₂</u> |
| 2. Copper (II) iodide <u>CuI₂</u> | 5. Lead (II) dichromate <u>Pb(Cr₂O₇)</u> |
| 3. Iron (II) phosphate <u>Fe₃(PO₄)₂</u> | 6. Mercury (I) chloride <u>HgCl</u> |

II. Binary Compounds containing Two Non-Metals

The name consists of the non-metal that is further toward the left and bottom of the periodic table, followed by the -ide form of the second non-metal.

Compounds containing more than one of the non-metal elements can be distinguished by:

Mono – one	Penta – five	Octa – eight
Di – two	Hexa – six	Nona – nine
Tri – three	Hepta – seven	Deca – ten
Tetra – four		



Ex. CO Carbon monoxide
CO₂ Carbon dioxide

Practice: Name the following compounds.

1. PBr₃ phosphorous tribromide
2. CS₂ carbon disulfide
3. Cl₂O₇ Chlorine Heptaoxide
4. SiO₂ Silicon Dioxide
5. N₂O₅ DiNitrogen PentaOxide
6. XeF₄ Xenon Tetrafluoride

Practice: Write the formula for the following compounds.

1. Dibromine tetraoxide Br₂O₄
2. Diiodine tetraoxide I₂O₄
3. Phosphorous triiodide PI₃
4. Tetrasulfur tetranitride S₄N₄
5. Sulfur hexafluoride SF₆
6. Oxygen dibromide OBr₂

V. Binary Inorganic Compounds (Acids)

Containing a hydrogen and a non-metal. Start with hydrogen then the -ide form of the non-metal. When this type of compound is in an aqueous solution it will form an acid, then state hydro for the hydrogen and add the suffix -ic to the non-metal.

An acid is a molecular substance that when dissolved in water produces hydrogen ions (H⁺).

Ex. HCl(aq) hydrochloric acid
H₂S (aq) hydrosulfuric acid

If the combination is hydrogen and a polyatomic ion change the -ate of the polyatomic ion to -ic.

Ex. C₂H₃O₂⁻ acetate → HC₂H₃O₂ acetic acid
PO₄³⁻ phosphate → H₃PO₄ phosphoric acid

VI. Ternary Compounds (Acids)

Chlorine, nitrogen, sulfur, phosphorus, and others form oxyacids. Oxyacids are ternary compounds with hydrogen and oxygen.

If the acid has the most oxygen then it has the suffix -ic.

If the acid has fewer oxygen then it has the suffix -ous.

If the acid has the greatest number of oxygen it has the prefix per-

If the acid has the least number of oxygen it has the prefix hypo-

Ex. HClO₄ Perchloric acid
HClO₃ Chloric acid
HClO₂ Chlorous acid
HClO Hypochlorous acid

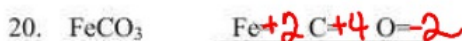
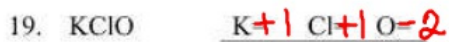
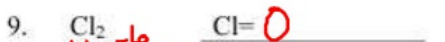
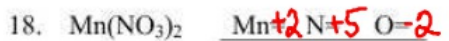
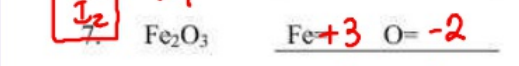
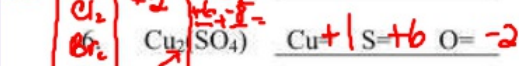
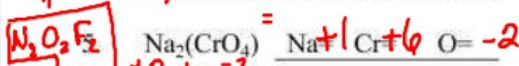
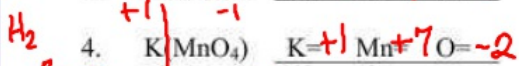
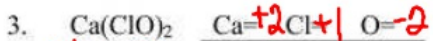
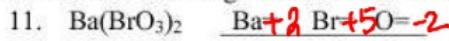
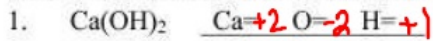
$$\frac{+7}{\text{Mn}} + \frac{-8}{\text{O}_4} = -1$$

IA	IIA	IIIA	IVA	VA	VI A	VIIA	VIIIA
1+	2+	3+	4+	3-	2-	1-	0
			4-				

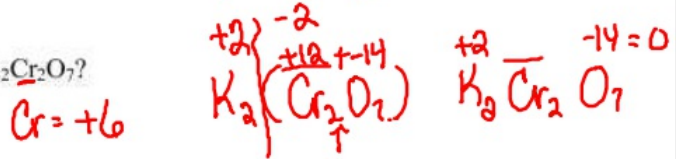
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Homework: Oxidation Numbers

Determine the oxidation number for each of the elements in the following molecules and ions.



4 21. What is the oxidation number of chromium in $\text{K}_2\text{Cr}_2\text{O}_7$?
 (1) +12 (3) +3
 (2) +2 (4) +6



2 22. In which substance is the oxidation number of Cl equal to +1?
 (1) Cl_2 (3) AlCl_3 -1
 (2) Cl_2O (4) HClO_2 +1 +3 -4
 HClO_2
 $\text{Cl} = +1$



4 23. In which substance does hydrogen have an oxidation number of zero?
 (1) LiH (3) H_2S
 (2) H_2O (4) H_2

4 24. In which compound does carbon have an oxidation state of -4?
 (1) CO^{-2} (3) CCl_4 -1
 (2) CO_2^{-2} (4) CH_4 -4 +1

4 25. What is the oxidation number of carbon in $\text{Na(HCO}_3)$?
 (1) -2 (3) -4
 (2) +2 (4) +4

