

Supplemental Nomenclature & Formula Writing 5-1

Classical Naming of Multivalent Compounds

INFORMATION

Stock vs. Classical Naming

The naming system for compounds containing multiple-charge cations (multivalent metals) that involves the use of Roman numerals following the cation to designate the magnitude of the positive charge is known as the **Stock naming system** (developed, incidentally, by a man named Alfred Stock). This system arose once chemists began to gain a greater understanding of the multiple-charge nature of some transition metals. It is commonly used today and accepted as the standard method for naming these compounds.

An older system of naming compounds is called the **classical system**. The classical system came into use by early chemists who understood that a difference existed between the compounds formed by metals that had more than one charge, but yet lacked the knowledge of the exact nature of this difference. This method has been in a phase-out process for some time, but classical names continue to find their way into literature and onto the labels of material containers.

The classical system involves using the Latin root names of the metal in question, followed by an *-ic* or *-ous* suffix, depending on the magnitude of the charge on the metal. *This system is only used for divalent metals, or metals with only two possible charges.* The *-ous* ending is used for the charge of lower magnitude, and the *-ic* is used for the charge of greater magnitude. Note that these names are not associated with a specific numerical charge, just the relative magnitudes of those charges.

Classical Names for Selected Ions

Symbol	Stock name	Classical name
Cu^+	Copper (I) ion	Cuprous ion
Cu^{2+}	Copper (II) ion	Cupric ion
Fe^{2+}	Iron (II) ion	Ferrous ion
Fe^{3+}	Iron (III) ion	Ferric ion
Hg_2^{2+}	Mercury (I) ion	Mercurous ion
Hg^{2+}	Mercury (II) ion	Mercuric ion
Pb^{2+}	Lead (II) ion	Plumbous ion
Pb^{4+}	Lead (IV) ion	Plumbic ion
Sn^{2+}	Tin (II) ion	Stannous ion
Sn^{4+}	Tin (IV) ion	Stannic ion
Cr^{2+}	Chromium (II) ion	Chromous ion
Cr^{3+}	Chromium (III) ion	Chromic ion
Mn^{2+}	Manganese (II) ion	Manganous ion
Mn^{3+}	Manganese (III) ion	Manganic ion
Co^{2+}	Cobalt (II) ion	Cobaltous ion
Co^{3+}	Cobalt (III) ion	Cobaltic ion
Au^+	Gold(I) ion	Aurous ion
Au^{3+}	Gold(III) ion	Auric ion

Student Name: _____ Pd. _____ Date: _____

Supplementary Exercises
Classical Naming of Multivalent Metals

Write the correct names for each compound using both the classical and the Stock systems, when appropriate.

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|--------------------------------|------------------------------|-------------------------------|
| 1. Cu_2SO_4 | 9. CuBr | 17. Sn_3P_4 |
| 2. $\text{Sn}(\text{OH})_2$ | 10. PbO | 18. CrCl_3 |
| 3. PbBr_4 | 11. Fe_2S_3 | 19. MnO_2 |
| 4. $\text{Pb}(\text{NO}_3)_2$ | 12. PbO_2 | 20. Hg_2O |
| 5. FeO | 13. CuS | 21. HgO |
| 6. Ag_2O | 14. ZnBr_2 | 22. HgCr_2O_7 |
| 7. $\text{Cu}(\text{ClO}_3)_2$ | 15. AuCl_3 | 23. Co_2S_3 |
| 8. Fe_2O_3 | 16. $\text{Fe}(\text{IO})_2$ | 24. CoO |

Rewrite the names for the following compounds using the classical system (when appropriate), and write a proper formula for each.

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|----------------------------|----------------------------|
| 25. iron (II) arsenate | 37. tin (IV) iodide |
| 26. tin (II) oxide | 38. lead (IV) nitride |
| 27. chromium (III) oxide | 39. cobalt (II) phosphide |
| 28. cobalt (III) phosphate | 40. tin (II) sulfide |
| 29. iron (III) chloride | 41. copper (II) iodide |
| 30. copper (I) sulfide | 42. chromium (II) nitride |
| 31. lead (IV) oxide | 43. manganese (II) oxide |
| 32. copper (II) sulfide | 44. mercury (II) fluoride |
| 33. tin (II) iodite | 45. tin (IV) oxide |
| 34. mercury (I) sulfide | 46. chromium (II) chloride |
| 35. gold (III) bromide | 47. tin (IV) chlorate |
| 36. lead (II) bromide | 48. iron (II) phosphide |