Chapter 10. Chemical Nomenclature

10.1. Chemical Language

Each society of people has its own language, and it is necessary to learn the language of the society to communicate effectively with it. Imagine, for example, what a foreigner might envision the first time they heard a sports announcer on a radio use terminology like ‘‘stealing’’, ‘‘sacrifice’’, and ‘‘high fly’’. The subjects of naming chemical substances, or *chemical nomenclature*, and writing chemical ‘‘equations’’ are basic to communication in the society of chemists. Language communicates information and the language of chemistry has evolved and improved with the understanding of chemical principles. For this reason, an understanding of chemical language in not only useful for communicating, but reflects an underlying understanding of the concepts of chemistry.

Unfortunately, partly due to historical precedent and partly due to conceptual limitations, there is no ultimate chemical language which describes uniquely everything known about a material, including molecular structure and chemical properties, and it may be assumed that chemical concepts yet to be discovered will lead to new ways of describing that knowledge.[1] For this reason, *several different systems of terminology are in use today*, each with advantages and disadvantages. It is assumed that somewhere along the career of the chemist, mentioning something like hydrogen sulfide will conjure up memories of rotten eggs and bent bonds the way the mention of the word water connotes a cool liquid that satisfies thirst and the symbols H_2O. The best we can do here is to introduce a few communication methods students are likely to encounter in introductory courses.

Chemical language is similar to other human languages, with element symbols forming the alphabet, chemical formulas the words, chemical equations the sentences and multistep chemical processes the paragraphs. Commercial production processes are chapters in the story of chemistry. Genetics, pollution and disease comprise entire volumes. Abbreviations

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[1] This is painfully clear to chemists who construct methods for communicating chemical structures to computers.

and phonemes are (unfortunately) extensively used also, particularly in areas where long, complicated names are found, such as organic chemistry and biochemistry. Story setting corresponds to the reaction conditions, and plot development to reaction yields and pathways. We shall explore a number of chemical grammars and show how to solve simple problems related to structure and nomenclature.

10.2. Common Names

Early chemical characterizations could not be based on chemical composition, which usually wasn't known, but rather on properties, such as color, taste, therapeutics (real or imagined), or origin. Substances were classified by *value* such as base (low), noble (high), regalus (kingly), by *taste* (a dangerous process) as with acids (sour), alkalies (bitter) or salts (salty), by *appearance* as with metals (lustrous), earths (insoluble) or airs (gaseous) and by *preparation* as with spirits (distillates), calxes (combustates), flowers (sublimates), coagulates (precipitates) or amalgams (combinates). These nonsystematic naming methods were often confusing, as a given substance might have several names, and the same name could be used for several substances. For example, what is known today as potassium carbonate was named after to a variety of sources as Salt of Wormwood, Salt of Tartar, spodium, fixed alkali salt, potash, etc. Magnesium sulfate, known commonly today as ‘‘epsom salts’’, was named for its appearance (calcareous earth), taste (Sal amarum), medicinal value (Sal catharticum), origin (Sal Epsom), and its discoverer (powder of Count Palma). Descriptive names like marsh gas, philosophical spirit of vitriol and pyrites (for fire) are not much improved by their modern counterparts, methane, muriatic acid and fool's gold, respectively. As the understanding of matter improved, more systematic names began to be developed.

10.3. Systematic Chemical Nomenclature

Nomenclature reflects understanding. As chemical understanding has developed, nomenclature has become more systematic. At the same time more complex substances have been explored, complicating the descriptive schemes. Systematic chemical nomenclature attempts to provide unambiguous descriptive names for compounds according to conventions called *nomenclature rules*. Different sets of nomenclature rules are used depending on how compounds are classified, and the type of information to be conveyed. Rules exist based on *source* (origin) for *organic* (carbon containing), *inorganic* (non-living), *biological* (living) and *mineral* (geologic) compounds. Names may also reflect *properties* (such as acidic or basic behavior) and *bonding*, including ionic, covalent and coordination bonding.[2] It is possible for complicated substances to belong to more than one naming category; for example the biochemical substance in red blood cells commonly called hemoglobin has both organic (protein) and inorganic (salt) components, and contains covalent, ionic and coordination bonding.

The atomic theory of matter produced a symbolic representation for the molecules of substances in which element symbols (cf. Sec. 7.3) are subscripted to represent the number of atoms of each element. For example H_2O represents molecules of water, each containing 2 atoms of hydrogen and one atom of oxygen. Such representations showing the composition of substances are called **chemical formulas** and form an alternative to alphabetic names.[3] Although composition formulas are systematic, they are not necessarily definitive when they display only smallest ratios of atoms (*empirical formulas*), or subunints of polymers (*monomers*), or fail to distinguish different structural arrangements (*isomers*).

Nomenclature addresses the connection between common names, systematic names and chemical formulas. Common names require some form of table lookup. Systematic names are derived from classifying the substance and applying the appropriate nomenclature rules. Conventional nomenclature rules can be found in specific publications devoted to nomenclature and references, such as the *CRC Handbook of Chemistry and Physics*, published by the Chemical Rubber Company Press.[4]

Substances are traditionally classified either as organic or inorganic, although the diversity of substances and interests prohibits a clean separation in all cases. With some exceptions, carbon containing compounds may be classified as organic and the rest are inorganic.[5] Subcategories of organic materials include biological substances and polymers, and subsets of inorganic matter include coordination complexes and minerals.

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[2] Cf. the chapter on Chemical Bonding.

[3] The quantitative aspects of chemical formulas are developed in Chapter 9.

[4] Be prepared! Nomenclature rules may occupy an hundred pages in recent editions.

[5] Certain simple carbon-oxygen compounds such as carbon oxides and carbonate derivatives are usually classified as inorganic. Coordination complexes are classified as inorganic, even if they contain organic ligands, and biochemical compounds are classified as organic, even when they contain inorganic metal ions. The distinction between "living" and "non-living" substances was eroded in 1828 by Friedrich Wöhler's simple conversion of the inorganic salt ammonium cyanate into the organic metabolite urea by heating: $NH_4OCN \rightarrow CO(NH_2)_2$.

10.4. Naming Inorganic Compounds

Inorganic compounds fall into three traditional categories describing their chemical reactive behavior, acids, bases and salts. Acids react with the bases in a process called ‘‘neutralization’’ to produce salts. In a sense acids and bases are opposites. This reflects their composition. For example, oxygen reacts with most elements to produce oxide compounds. The oxides of non-metal elements dissolve in water to produce acidic solutions, while oxides of metal elements dissolve in water to produce basic solutions. A standard model (which is somewhat restricted but adequate for many purposes) recognizes acids as substances containing reactive hydrogen atoms, or more precisely their reactive form, protons, and bases as substances which can react with the reactive protons; neutralization involves the transfer of protons.

Inorganic acids fall into two major groups, *hydroacids* and *oxoacids* (both of which contain hydrogen). Hydroacids do not contain oxygen while oxoacids contain OH groups. Acid names consist of a word to distinguish the acid followed with the word *acid*.

Hydroacid names are constructed by prefixing the non-hydrogen element or group of elements with ‘‘hydro’’ and adding the suffix ‘‘ic’’. For example, HCl is hydrochloric acid, H_2S is hydrosulfuric acid, and HCN is hydrocyanic acid.

Oxoacids are further classified according to their other non-hydrogen element(s). There may be several members in a class, having the same elements but differing in the numbers of atoms of the elements. For example HNO_n, with n = 2,3,4. There are 4 common oxoacids of the halogens, at least 6 known oxoacids of nitrogen, 11 of phosphorus, 14 of sulfur, and host of other non-metal and metal-containing oxoacids. The number increases when multiple elements (besides oxygen and hydrogen) are considered. Naming is not very systematic; to distinguish the various members of an element class a variety of prefixes are suffixes are employed. The prefix *hypo* (Greek for less) and the suffix *ous* refers to less oxygen atoms than some member, while the prefix *per* (Latin for through) and the suffix *ic* refers to more oxygen. Table 10.1, which lists some non-metal oxoacids, illustrates the variety as well as incompleteness of oxoacids. The *ortho* prefix (Greek for straight) is optional and *mono* (Greek for unity) may be used as an alternative. The *pyro* (Greek for fire) acids are first members of series of polymer (Greek for many bodies) molecules which are formed by heating to combine n molecules of the ortho acid and eliminate n-1 molecules of water. The Greek prefix *meta* (for after) is sometimes used to denote the general formula, such as $(HPO_{3n})H_2O$ with n = 1,2,... for the polyphosphoric acids.

Table 10.1 Selected Non-Metal Oxoacids

acid	*ortho-*	*pyro-*	*hypo-*	*per-*
boric	H_3BO_3	$H_2B_4O_7$	$H_4B_2O_4$	
carbonic	HCO_3			
silicic	H_4SiO_4			
nitrous	HNO_2		$H_2N_2O_2$	
nitric	HNO_2			
phosphorous	H_3PO_3	$H_4P_2O_5$	H_3PO_2	
phosphoric	H_3PO_4	$H_4P_2O_7$	$H_4P_2O_6$	
sulfurous	H_2SO_3	$H_2S_2O_5$	$H_2S_2O_4$	
sulfuric	H_2SO_4	$H_2S_2O_7$		
chlorous	$HClO_2$		HClO	
chloric	$HClO_3$			HClO4

Common related oxoacids not included in the table include *peroxy* nitrous, nitric, phosphoric and sulfuric acids, containing a dioxygen group in place of an oxygen atom, and a polythionic acid series (*thio* is a Greek alternative for sulfur) with the general formula $H_2S_nO_6$. Bromine and iodine form oxoacids similar to those of chlorine, except there are no analogues to chlorous acid (the only known fluorine oxoacid is HOF). Arsenic forms some acids similar to phosphorous and selenium some similar to sulfur. Some transition metals form oxyacids, including manganese (manganous acid H_2MnO_3, manganic acid H_2MnO_4, permanganic acid ($HMnO_4$)) and chromium (chromic acid, H_2CrO_4 and dichromic acid, $H_2Cr_2O_7$).

Classic bases contain hydroxide (OH) groups and are named the same way salts are. Inorganic salts are compounds with two parts, a more positive part, named first, followed by the more negative part, named last. Element names are used for monatomic parts and common names for polyatomic parts. Positive polyatomic ions end with *ium* and all negative parts end in *ide, ite* or *ate*. If there is more than one atom or group of atoms in a molecule, Greek prefixes indicate the number that appear in the chemical formula for the substance. Naming simple *binary compounds* containing only two elements is straightforward (once the more positive and more negative elements are distinguished), e.g. sodium chloride, dinitrogen pentoxide, etc. More complicated compounds require understanding the chemical bonding to identify the constituent parts. However, periodic and polyatomic ion tables provide the needed information.

The chemical periodic table arranges elements in columns indicating the atomic charge in binary compounds. For elements within four columns of the edges of the periodic table, the charge can be determined from the formula:

$$\text{atomic charge} = \text{number of columns from the edge of the periodic table} \qquad (10.1)$$

Counting is *positive* from the left edge and *negative* from the right edge. Roman numerals may be used to indicate the positive charges on metal ions (negative charges are customarily not mentioned, but can be deduced knowing the total charge on the compound). Thus the neutral (no net charge) compounds CuCl and $CuCl_2$ may be named copper chloride and copper dichloride, or copper (I) chloride and copper (II) chloride, respectively which are consistent with a negative one charge for chloride. When two or more elements have the same sign, the charge is considered to become more negative going to the right in the periodic table. Thus nitrogen is named before oxygen in dinitrogen pentoxide.

Naming inorganic compounds containing more than two elements is expedited with a table of polyatomic covalent ions, such as the one below. Note that most of the common polyatomic ions are negative (anions).

Table 10.2 Common Polyatomic Ions

Formula	*Name*
CN^-	cyanide
OH^-	hydroxide
HS^-	hydrogen sulfide
CO_3^{2-}	carbonate
HCO_3^-	hydrogen carbonate
ClO_3^-	chlorate
CrO_4^{2-}	chromate
$Cr_2O_7^{2-}$	dichromate
$H_2PO_4^-$	dihydrogen phosphate
MnO_4^-	permanganate
NH_4^+	ammonium
NO_3^-	nitrate
NO_2^-	nitrite
PO_4^{3-}	phosphate
HPO_4^{2-}	hydrogen phosphate
SO_4^{2-}	sulfate
HSO_4^-	hydrogen sulfate
SO_3^{2-}	sulfite

These considerations may be organized into a naming algorithm:

Inorganic Compound Nomenclature Algorithm

Purpose: To name an inorganic chemical substance given the molecular formula.

Procedure:

1. If there is only one element in the formula, name the element using a Greek prefix indicating the number atoms in each molecule of the element.
2. If there are only two elements in the formula, name the element to the left in the chemical periodic table, followed by that to the right modified to end in *ide*. Use Greek prefixes to indicate the numbers of atoms in ambiguous cases. Aqueous solutions of binary compounds containing hydrogen are hydroacids and are named with a prefix *hydro* to the root of the non-hydrogen element followed by the suffix *ic acid*. Water, which is hydrogen hydroxide is an exception (an acid and base combination).
3. If there are more than two elements in the formula, use a Polyatomic Ion Table to identify and name the polyatomic parts. Modify monatomic anions to end in *ide*, and use Greek prefixes to indicate the numbers of ions in ambiguous cases. Compounds between positive ions and hydroxide are bases and are named the same as salts. Ternary compounds containing hydrogen are named as hydroacids. Compound containing hydrogen bound to oxygen that are not bases are oxo-acids and are named by the stem of the non-hydrogen, non-oxygen element with an *ic* suffix. If there are multiple cases with the same elements, those with more oxygen atoms add the prefix *per*, those with fewer oxygen atoms are suffixed *ous* and those with still fewer add the prefix *hypo*.

Example 10.1 Name O_3, LiH, and $FeHPO_4^{2-}$.

1. O_3 has only one element. Its systematic name is *trioxygen*. It is commonly known as *ozone*.
2. LiH has two elements. Its name is *lithium hydride*.

3. $FeHPO_4$ has more than two elements. HPO_4 is found in the Polyatomic Ion Table and has the name *hydrogen phosphate*. The compound could be named *iron di(hydrogen phosphate)*, which might be confused with *iron dihydrogen phosphate*, $Fe(H_2PO_4)_2$. It would be less confusing to call it *iron (II) hydrogen phosphate*, which reflects the charges on the parts.

10.5. Naming Organic Compounds

The large variety of organic substances is the result of carbon *catenation*, literally the chaining together of carbon atoms. Since most organic compounds are comprised of non-metallic elements, covalent bonding prevails. Chemical formula pictures showing the relative positions of the atoms and chemical bonds, called *structural formulas*, form a useful bridge between composition formulas and names.

A carbon-hydrogen *hydrocarbon* backbone forms the foundation of the name of an organic substance, which is prefixed by names of groups of atoms with similar properties attached to the backbone, called *functional groups*. Functional groups are also referred to as *substituents* because they conceptually replace (substitute for) hydrogen atoms on the hydrocarbon backbone (actual syntheses may require indirect routes). Using R to stand for the remaining portion(s) of the molecule, some common functional groups are: *carboxylic acids* (RCOOH), *aldehydes* (RCOH), *ketones* (RCOR'), *alcohols*[6] (ROH), *amines* (RR'R"N), *ethers* (ROR'), *sulfide* (RS), *halides* (RX), *esters* (RCOOR'), *acyl halides* (RCOX), *amides* ($RCONH_2$), When groups of hydrocarbon atoms are treated as substituents, they are called *radicals*. Molecules having loops (rings) of carbon atoms are called *cyclic*, or *heterocyclic* if some of the carbon atoms are repaced by other elements (heterocyclics are not discussed here).

Hydrocarbons are classified according to the their carbon-carbon bonding. Those with single bonds are called *saturated* hydrocarbons, or *alkanes*, and have formulas C_nH_{2n+2} if they contain no rings. Trivial names are used for the first four members with systematic Greek prefixes for the remainder, *methane* ($n = 1$), *ethane* ($n = 2$), *propane* ($n = 3$), *butane* ($n = 4$), *pentane* ($n = 5$), etc. Hydrocarbons with multiple carbon-carbon bonds are called *unsaturated* hydrocarbons; *alkenes* in the case of double bonds (formulas C_nH_{2n} if no rings),

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[6] Aromatic alcohols are called *phenols*.

and *alkynes* in the case of triple bonds (formulas C_nH_{2n-2} if no rings), and are named in similar fashion to alkanes. Rings (indicated by the prefix *cyclo-*) are possible beginning with C_3, isomeric bonding alternatives are possible beginning with C_4, and cyclic carbon rings with alternating single and double bonds called *aromatics* are possible beginning with C_6.[7] Aromatic hydrocarbons are classified according to the rings they contain; nonsystematic names are used: one six-membered carbon ring is called *benzene*, two fused six-membered carbon rings are called *napthalene*, etc.; as substituents, they are called *phenyl*, *napthyl*, etc.

For naming purposes, the backbone is the longest chain of carbon atoms, or fused carbon rings in the case of aromatics. Non-aromatic double and triple bonds are indicated with suffixes *ene* and *yne*, respectively, modified by Greek prefixes indicating how many there are and with Arabic numbers indicating their position along the chain. Substituents are named first in alphabetical and then in positional order, with Arabic numerical prefixes indicating the carbon atoms of the backbone to which they are attached.

Ambiguous chemical formulas must be supplemented by descriptive information regarding the bonding and spatial orientation of atoms.

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[7] Nonaromatics are sometimes called *aliphatics*.

Organic Compound Nomenclature Algorithm

Purpose: To name an organic chemical substance given a molecular formula.

Procedure:

1. Draw a picture (Lewis structure) of the molecule from the given formula.
    a) Arrange the carbon atoms in the order they are given in the formula, excluding functional groups but including any carbon-chain branches.
    b) Arrange the functional groups and any remaining hydrogen atoms near the carbon atoms preceding them in the formula.
    c) Add lines representing chemical bonds to each atom equal in number to the valence of the atom, arranging them to connect the atoms with single, double or triple bonds and/or rings.
    d) Identify carbon rings with alternating single and double bonds as aromatic.
2. Name a hydrocarbon backbone.
    a) Choose a hydrocarbon backbone as either the longest chain of carbon atoms or fused carbon rings.
    b) Name the backbone according to the number of carbon atoms, n: for aliphatics, *methane* for n = 1, *ethane* for n = 2, *propane* for n = 3, *butane* for n = 4, *pentane* for n = 5, etc; for aromatics, *benzene* for n = 6, *napthalene* for n = 10, etc.
3. If there any aliphatic (non-aromatic) multiple bonds, modify the aliphatic hydrocarbon names by replacing *ane* endings with *ene* for double bonds and *yne* for triple bonds.
4. Name the substituents.
    a) Replace hydrocarbon substituent endings with *yl* endings.
    b) Prefix the backbone name with an alphabetical list of the functional group names.
    c) Use Greek prefixes (*di, tri, tetra*, etc) to indicate multiples of each type.
5. Resolve ambiguous positions with numbers.
    a) Number the carbon atoms of the backbone in some sequence.

b) Prefix groups with hyphenated Arabic numbers (*1-, 2-, 3-*, etc) to indicate the positions of the carbon atoms on the backbone with which they are associated.

Example 10.2 Name the compound having formula $C_6H_5CHClCHOHCl$

1. The C_6H_5 group could be a carbon branch or ring functional group. Which it is will be decided when the bonds are added. Besides hydrogen atoms, chlorine and alcohol functional groups can be seen. Arranging the groups around the two remaining carbon atoms and connecting the atoms together using four valence lines for each carbon atom yields a substituted C_2 fragment, saturated with single bonds, preceded by the C_6H_5 group. This group could be a six-carbon chain with one triple and two double bonds, or a six-carbon ring with three double bonds, etc. However, in the case of a chain we would expect the carbon and hydrogen atoms to be grouped together, such as CH_2CHC_2CHCH, so we deduce that C_6H_5 is a ring. There are still a number of possible bonding arrangements for the C_6H_5 group. Experience (only) teaches us that it is probably an aromatic benzene fragment, with alternating single and double carbon-carbon bonds. As a substituent, it is called phenyl.
2. Since the two-carbon group is longer than the benzene ring (considered a single group), choose it as the backbone, and name it ethane.
3. There are no multiple bonds outside the aromatic phenyl group.
4. Arrange the substituents alphabetically: chloro, ol (alcohol) and phenyl. Prefix the chloro with di.
5. Number the carbon atoms of ethane in the order in which they appear in the given formula. Identify the number of the carbon atom to which each substituent is attached. The final result is *1,2-dichloro-2-ol-1-phenylethane*.

The name 1,2-dichloro-2-phenylethanol would be more common, but would imply knowledge of how the substance might be prepared.

10.6. Naming Coordination Complexes

Coordination complexes are a special class of compound consisting of central metal ions surrounded with groups of covalently bonded atoms, called *ligands*. Metal ions are classified by the number of bonds to ligands they form, called the *coordination number*. Ligands are classified according to the number of bonds they form with the central ion; *monodentate*, *bidentate*, etc. for one, two, etc. bonds. Multiply-bound ligands are called *polydentates*, or *chelates*. Complexes are classified by their geometries: *linear, square planar, tetrahedral, octahedral, trigonal bipyramidal*, etc. Isomers are distinguished by *cis*- and *trans*- prefixes, signifying ligand bonding at adjacent and opposite coordination metal sites, respectively.

The name of the metal is preceded by the names of the ligands in alphabetical order using Greek prefixes (*di, tri, tetra, penta*, etc) to indicate multiple monodentate ligands of the same type, and Sanskrit prefixes (*bis, tris, tetrakis, pentakis*, etc) to indicate multiple polyentate ligands. Cationic (positive charged) ligands have *ium* suffixes, anionic (negative charged) ligands have *o* suffixes, and neutral ligands unchanged with some notable exceptions for such as *aqua* for water, *ammine* for ammonia, *carbonyl* for carbon monoxide and *nitrosyl* for nitrogen monoxide.

Complexes may have positive, negative or neutral net charge, depending on the sum of the charges of the metal ions and ligands (which may be positive, negative or neutral themselves). Negative complex ions are given the suffix *ate*. Coordination *compounds* containing ionic parts consist of complex ions or inorganic ions; they are named like binary inorganic compounds, with the cationic parts preceding the anionic parts.

Complex naming rules are straightforward and may be organized into the following naming algorithm:

Coordination Complex Naming Algorithm

Purpose: To construct the name of a coordination compound from its formula.

Procedure:

1. Identify the complex ions given in square brackets in the formula. Name cations before anions, separated with a space. Append the suffix *ate* to complex anions.
2. For each complex, name the ligands before the metal ions.
    a) Identify the ligands as inorganic and organic molecules. Certain parenthesized abbreviations are used to represent long names, such as *en* for bidentate ethylenediamine ($H_2NCH_2CH_2NH_2$), *edta* for tetradentate ethylenendiaminetetraacetato ($((CH_2)_2(N(CH_2CO_2))_2)^{4-}$), and ox for bidentate oxalato ($((COO)_2^{2-}$).
    b) Give cationic (positive charged) ligands *ium* suffixes, anionic (negative charged) ligands *o* suffixes, and leave neutral ligands unchanged, except for certain common substances such as *aqua* for water, *ammine* for ammonia, *carbonyl* for carbon monoxide and *nitrosyl* for nitrogen monoxide.
    c) List the ligands in alphabetical order using Greek prefixes (*di, tri, tetra, penta*, etc) to indicate multiple monodentate ligands of the same type, and Sanskrit prefixes (*bis, tris, tetrakis, pentakis*, etc) to indicate multiple polyentate ligands.
3. For each complex, append the name of the metal ion to the list of ligands to which it is attached.
    a) Use Latin names for the metal ions of anionic complexes.
    b) Determine the charge on the metal ion by subtracting the sum of the ionic ligand charges from the total charge on the complex.
    c) Append the charge on each metal ion to its name using parenthesized Roman numerals.

Example 10.3 Name the complex compound $[Co(en)_2Br_2]Cl$.

1. There is one bracketed complex ion. It is named before the inorganic chloride ion.
2. The ligands in the complex cation are *en*, which stands for the complicated neutral organic *ethylenediamine*, and inorganic negative Br^-, named *bromo*. Using a Sanskrit prefix and retaining the parentheses for the abbreviated ligand, the ligand portion is named *bis(ethylenediamine)dibromo*.
3. The complex has charge +1, balancing the charge on the chloride ion. Since en has zero charge and each bromo has −1 charge, the charge on the cobalt metal ion $= +1 - (-2) = +3$.

The total name is *bis(ethylenediamine)dibromocobalt(III) chloride*.

Summary

Chemical nomenclature ranges from arbitrary names through systematic procedures based on composition, properties and bonding. Rules for (carbon containing) organic, (noncarbon) inorganic and (metal-ligand) complexes are commonly used. Chemical formulas conveying compositional and structural information provide unambiguous graphic representations of molecules of all types.

CHEMICAL NOMENCLATURE EXERCISES

1. Construct an algorithm for deriving organic chemical formulas from names.
2. How does sodium nitride differ from sodium nitrite?

CHEMICAL NOMENCLATURE EXERCISE HINTS

1. The algorithm should look something like the Organic Compound Nomenclature
2. More than just one letter difference. Algorithm.