

HCPA DICTIONARY NOMENCLATURE CONVENTIONS

The Household & Commercial Product Association (HCPA) Product Ingredients Dictionary utilizes the following conventions to ensure that consumer product ingredient names (HCPA Name) are concise, consistent and unique. These conventions are based closely on the nomenclature conventions use by the Personal Care Products Council in assigning INCI names but are expanded to more adequately address the types of ingredients typically found in formulated products. These conventions will be continually reviewed and modified when necessary to reflect changes in the industry and new ingredient developments.

GENERAL CONVENTIONS

1. Simple chemical names are used wherever possible.
2. Recognized chemical abbreviations are used where applicable.
3. Traditional stem names are retained as combining forms when consistent with other systems.
4. Name/number combinations are used as HCPA names for cosmetic ingredients only where the complexity and/or similarity of ingredients precludes assignment of reasonable nomenclature by any other means. The stem names are suggestive of the structure or the composition of the material, e.g., Polysilicone-1. For the purpose of consistency, this shorthand classification will be maintained for all materials within these categories. Where descriptive terminology is desired for a particular component of a raw material that would fall under these classifications, alternate nomenclature may be provided.
5. Specific names previously used in the *International Cosmetic Ingredient Dictionary* (INCI) are retained in most cases.
6. Compounds that are similar to materials described in recognized sources are given analogous names whenever possible.
7. Names of ingredients, other than colorants, that contain terminal numbers are generally hyphenated. Derivatives of hyphenated materials retain the original hyphen.
8. Hydration states are often not expressed.
9. Compounded mixtures created by blending materials are generally named by listing each component. Only intentionally added components are named. Ingredients that are compounded proprietary mixtures where the chemical identity one or more components represent Confidential Business Information (CBI) may be assigned names based on description of the ingredient's chemical classification or function. In such cases, the ingredient monograph will provide clear indication that some or all components are proprietary. Exceptions to this rule may also be provided for certain ingredient functional classes such as fragrances.
10. Water, ethyl alcohol, and other diluents or solvents contained in commercially available raw materials, except extracts, are not normally identified as part of the HCPA name. See Labeling

Reminders, for additional information on the labeling of solvents and/or diluents that may be present in raw materials.

11. All ingredient applications will result in the ingredient being given a HCPA name, or being assigned multiple HCPA names for its components. Proprietary ingredients will be named according to the conventions noted for proprietary components of mixtures (see 9.).
12. To facilitate use and clarity, HCPA names have been designed to require a minimum of punctuation and capitalization.
13. Wherever new nomenclature has been adopted, every effort has been made to use the shortest name consistent with these rules.
14. HCPA reserves the right to provide specific nomenclature in certain cases to make the nomenclature more informative to the consumer.

SPECIFIC CHEMICAL NOMENCLATURE CONVENTIONS

Alkanolamides

15. Alkanolamides are named by the specific alkyl amide stem and the appropriate abbreviation, e.g., "MEA," "DEA."

Alkoxyated Materials

16. Alkoxyated materials are named by including the alkoxylation level as the average number of moles of ethylene oxide and/or propylene oxide. Ethoxylates, which are commonly expressed by an approximate molecular weight, are converted to the number of moles using the following table:

Approximate Average Molecular Weight	Number of Moles
100	2
200	4
300	6
400	8
450	9
500	10
600	12
1000	20
1540	32
1800	36
2000	40
3000	60
4000	75
6000	150
8000	180

Numerical designations included in Technical/Other Names for ethoxylated compounds describe the average number of moles of ethoxylation when stated parenthetically, e.g., Polyethylene Glycol (40). Without parenthetical notation, the numerical value identifies molecular weight, e.g., Polyethylene Glycol 2000.

17. a. Ethoxylated alcohols are named by completing the conventional alcoholic stem name with "-eth" followed by the average number of moles of ethylene oxide. Propoxylated alcohols are named as PPG derivatives, e.g., PPG-10 Lauryl Ether.
- b. The term Alkoxynol-n refers to an ethoxylated alkyl phenol where n is the average ethoxylation value. The following table references the alkoxynol stem to its alkyl group.

Alkoxynol Name	Alkyl Group
Octoxynol	Tetramethylbutyl
Nonoxynol	Nonyl
Dodoxynol	Dodecyl or Tributyl
Pentadoxynol	Pentadecyl

18. a. The polyethylene glycol fraction of all ethoxylated compounds not named as above is abbreviated as the acronym "PEG." This combining form is followed by the average number of moles of ethylene oxide.
- b. Polypropylene glycol is abbreviated as the acronym "PPG." This combining form is followed by the average number of moles of propylene oxide.
- c. Polyethylene imine is abbreviated as the acronym "PEI". This combining form is followed by the average number of moles of ethylene imine (aziridine).
- d. Homopolymers of ethylene glycol and propylene glycol are named as PEG-X and PPG-X, respectively, with X equal to the average number of moles of alkoxylate. Homopolymers of aziridine are named as PEI-X, with X equal to the average number of moles of ethylene imine.
- e. Alkoxylated esters are named as PEG and PPG derivatives, e.g., PPG-10 Stearate.
- f. PEG and PPG polymers or their derivatives in which one of the terminal primary alcoholic groups (CH₂OH) has been oxidized to the carboxy group (-COOH), are named by adding the terms "carboxylic acid" or "carboxylate" to the parent name of the original polymer. For example, PEG-10 oxidized to carboxylic acid would be named PEG-10 Carboxylic Acid.
- g. Poloxamers, Merxapols, and Poloxamines are named in accordance with Rule 6 above. The term "Poloxamer" denotes a block copolymer consisting of polypropylene glycol terminated with polyethylene glycol. The term "Merxapol" denotes a block copolymer consisting of polyethylene glycol terminated with polypropylene glycol. The term "Poloxamine" denotes a block copolymer of ethylene diamine with N, N, N', N', polypropylene glycol and polyethylene glycol.

- h. Block and random copolymers of polyethylene glycol and polypropylene glycol not named in g. are named as PEG/PPG-X/Y Copolymer, where X is the average ethoxylation value and Y is the average propoxylation value, e.g., PEG/PPG-240/60 Copolymer. The sequence (block or random) and the terminal groups are described in the monograph definition of each ingredient.

Alkyl Groupings

19. The nomenclature for ingredients consisting of mixtures of similar materials (e.g., fatty acids, fatty alcohols) is determined on the basis of the chemical identity of the raw material as purchased. Mixtures that reflect the original distribution of components due to their natural source are named utilizing the source stem, e.g., Coconut Alcohol. If the original natural distribution has been significantly cut or enriched, the mixture is named on the basis of the predominant component according to the common name of the source (e.g., Canola Oil, Helianthus Annuus (Sunflower) Seed Oil, Soy Acid, Tallow Alcohol). Derivatives of these materials are named in a similar manner (e.g., Ammonium Palm Kernel Sulfate, PEG-5 Avocadoate, Tallowaminopropylamine.)
20. Nomenclature for materials that result from feedstocks that are mixtures, (e.g., mixtures of fatty acids) are designated by the names of the alkyl groups separated by a slash, e.g., Caprylic/Capric Glycerides, Glyceryl Isostearate/Myristate, Pentaerythrityl Stearate/Caprate/Caprylate/Adipate. An exception to this convention is the historical usage of the terms "cetearyl" and "cetoleyl" to identify a feedstock mixture of cetyl/stearyl alcohol and cetyl/oleyl alcohol, respectively.
21. Materials containing mixtures of even-carbon, straight chain length fractions are named by the appropriate, commonly used fatty stem term.
22. The term "Pareth" applies to ethoxylated paraffinic alcohols containing both even- and odd-carbon chain length fractions.
23. Straight-chain alkyl groups are described by their common stem names. The following table describes the nomenclature applied to straight-chain acids and alcohols.

Saturated:

Chain Length	Acid	Alcohol
C6	Caproic	Hexyl
C7	Heptanoic	Heptyl
C8	Caprylic	Caprylyl
C9	Pelargonic	Nonyl
C10	Capric	Decyl
C11	Undecanoic	Undecyl
C12	Lauric	Lauryl
C13	Tridecanoic	Tridecyl
C14	Myristic	Myristyl
C15	Pentadecanoic	Pentadecyl
C16	Palmitic	Cetyl
C17	Margaric	Heptadecyl
C18	Stearic	Stearyl

C20	Arachidic	Arachidyl
C22	Behenic	Behenyl

Unsaturated:

Chain Length	Acid	Alcohol
C11	Undecylenic	Undecylenyl
C16	Palmitoleic	Palmitoleyl
C18	Oleic	Oleyl
C18	Linoleic	Linoleyl
C18	Linolenic	Linolenyl
C20	Arachidonic	Arachidonyl
C22	Erucic	Erucyl

24. Branched-chain alkyl groups are usually described by the prefix "iso" followed by the common stem name for the comparable straight-chain group (e.g., Isostearyl Alcohol, Isocetyl Alcohol). The major exception to this rule is the nomenclature for the Guerbet alcohols. These materials are named chemically (e.g., Octyldodecanol, Decyltetradecanol).

25. The following table has been included to clarify the nomenclature for derivatives of caproic, caprylic, and capric acids.

Chain Length	Stem Name	Acid	Ester
C6	Capro	Caproic	Caproate
C8	Capryl	Caprylic	Caprylate
C10	Capr	Capric	Caprate

Chain Length	Acyl	Alkyl	Ampho
C6	Caprooyl	Caproyl	Caproo
C8	Capryloyl	Caprylyl	Caprylo
C10	Caproyl	Capryl	Capro

Biological Materials

26. Biological materials are named specifically when the material has been isolated, purified, and chemically characterized. General nomenclature for biological materials is utilized for materials in accordance with the extent of their processing.

Denatured Alcohol

27. Specially Denatured (SD) Alcohols used in products marketed in the United States are named in compliance with Title 27 of the U.S. Code of Federal Regulations (27 CFR). Manufacturers using SD Alcohols should consult 27 CFR and the U.S. *Federal Register* for permitted uses, restrictions, and proposed changes.

Imidazolines

28. Common fatty stem terms are used to designate the alkyl portion of alkyl imidazoline compounds (e.g., Lauryl Hydroxyethyl Imidazoline) even though one carbon atom of the fatty radical becomes a member of the heterocyclic ring during the materials' manufacture.

Hydrocarbon Mixtures

29. Petroleum distillates are hydrocarbon fractions obtained in an industrial process, in which crude oil is processed and refined. Petroleum distillates are usually grouped based on their distillation temperature ranges into three categories: light, middle, and heavy. This classification is not applicable to synthetic hydrocarbons, botanical extracts, or hydrocarbons with narrow range carbon chains.

- a. The term "light" may be used for hydrocarbon mixtures with boiling range of 80-205°C and C6-16 carbon chains.
- b. The term "middle" may be used for hydrocarbon mixtures with boiling range of 205-340°C and C12-25 carbon chains.
- c. The term "heavy" may be used for hydrocarbon mixtures with boiling range of 340 – 580°C and with the carbon chains of C20 and up.
- d. Numeric description of carbon chain lengths may be used in the HCPA name, if the carbon chains in the mixture include more than one distillation range, or in the cases where such indication is important.

30. Hydrocarbons are the group of compounds containing only carbon and hydrogen. Hydrocarbons are generally derived from petrochemicals, but some of them are found in the plant and animal kingdom. Their structures can vary widely, and include alkanes, cycloalkanes, alkenes, alkynes, and aromatic compounds.

- Aliphatic compounds are acyclic or cyclic non-aromatic hydrocarbon compounds.
- Alkanes (paraffins) are hydrocarbons with the general formula C_nH_{2n+2} . Paraffin wax is a mixture of alkanes with C20-40 carbon chains.
- Alkenes are hydrocarbons that have a carbon-carbon double bond. They generally conform to the formula C_nH_{2n} .
- Alkynes are hydrocarbons that have a carbon-carbon triple bond. They generally conform to the formula C_nH_{2n-2} .

- Aromatics (arenes) are hydrocarbons that contain conjugated planar ring systems with alternating double and single bonds between carbon atoms. Petroleum distillates containing aromatic hydrocarbons are usually divided into three categories: low (< 2%), medium (2 to < 8%), and high (> 8%).
 - Cycloalkanes (naphthenes) are alkanes which have one or more rings of carbon atoms in their structures.
 - Naphtha is a complex mixture of petroleum hydrocarbons with boiling range from 30 °C to 200 °C.
 - Naphthenic oils are characterized by high content (more than 35-40%) of cyclic hydrocarbons.
 - Paraffinic oils are characterized by high content (more than 55-60%) of n-alkanes.
- a. The term “alkane” may be used for hydrocarbon mixtures that contain more than 55-60% alkanes.
 - b. The term “cycloalkane” may be used for hydrocarbon mixtures that contain more than 35-40% cycloalkanes.
 - c. The term “aromatic” may be used for hydrocarbon mixtures that contain more than 2% aromatic hydrocarbons.
31. Petroleum distillates often undergo treatment to remove impurities or to change chemical composition of the final hydrocarbon mixtures.
- a. Acid-treated petroleum distillates are obtained as a raffinate from a sulfuric acid treating process and are usually consisting of hydrocarbons with boiling range of 90°C to 230°C.
 - b. Clay-treated petroleum distillates are obtained by removal of traces of impurities – gums and gum-forming materials - by application of clay, usually in vapor phase. The clay retains longer chain molecules within its highly porous structure.
 - c. Hydrogenated petroleum distillates are obtained in a process of conversion of aromatics to aliphatics by reaction with hydrogen in the presence of a catalyst.
 - d. Hydrotreated petroleum distillates are obtained in a chemical engineering process in which reaction with hydrogen is used to remove impurities. Hydrotreating is widely used to remove sulfur from refined petroleum products.
 - e. Straight run petroleum distillates are hydrocarbons obtained by direct distillation from crude oil. Straight run petroleum distillates are usually low in aromatics, contain some cycloalkanes and no olefins.

Minerals

32. a. Naturally occurring minerals with a definite chemical composition and/or physical properties are named according to the nomenclature established in published mineralogy texts, including,

but not limited to: Cornelis Klein and Cornelius S. Hurlbut, Jr., *Manual of Mineralogy* (after James D. Dana), Twenty-First Edition (1985), John Wiley & Sons, Inc., New York. Carmichael, Robert S., *CRC Practical Handbook of Physical Properties of Rocks and Minerals*, (1989), CRC Press, Inc., Boca Raton, FL 33431. Schumann, Walter, *Gemstones of the World*, (1997), Sterling Publishing Co., Inc., New York.

- b. Naturally occurring materials that are mixtures of mineral species are named using the common name such as sand, clay, silt, and other similar terms. Some materials may be named according to their geographical origin when the source of the mineral can be documented in the literature where the chemical composition and other properties of the material are defined.
- c. The term "synthetic" is applied to the names of inorganic materials such as rocks, gems, and minerals, (e.g. Synthetic Ruby) to indicate that the material is synthesized. These materials, while generally physically indistinguishable from their natural counterparts, are chemically similar, but may vary in chemical composition. X-ray diffraction patterns may characterize the compositional differences between natural and synthetic materials.
- d. Rocks, gems, and minerals that are mechanically ground (i.e., not ground by natural processes) are named by the common geological term followed by the term "powder," (e.g., Ruby Powder).

Oils and Triglycerides

- 33. a. Triglycerides of plant or animal origin that are liquid at room temperature are generally known as fixed oils and are named by their source followed by the term oil, e.g., *Olea Europea* (Olive) Oil, *Elaeis Guineensis* (Palm) Kernel Oil, Canola Oil, Cod Liver Oil. Oils which have been chemically modified by acetylation, hydrogenation, or oxidation are named in a similar fashion, e.g., Acetylated Castor Oil, Hydrogenated Palm Kernel Oil, Oxidized Corn Oil.
- b. Triglycerides of plant or animal origin that are solid at room temperature are generally known as fats and are named by their source followed by the term fat or butter, e.g., Deer Fat, *Theobroma Cacao* (Cocoa) Seed Butter.
- c. Essential oils that are water insoluble fractions of plant materials obtained by steam distillation are named by their source followed by the term oil, e.g., Rose Flower Oil, *Salvia Officinalis* (Sage) Oil.
- d. The term "oil" may be used to name non-triglycerides when it applies to ingredients that are commonly recognized, (e.g., Egg Oil, Jojoba Oil, Lanolin Oil, Mineral Oil, Tall Oil, Tar Oil.).

Polymers

- 34. Polymeric materials are named according to the name in common usage if it is well known, or by the structure if well-defined. If no common name exists, and the structure is not well-defined, the polymers are named according to their source as described below.
 - a. Homopolymers (consisting of one constituent monomer) are named by placing the term "poly" before the constituent monomer, e.g., Polyisobutene.

- b. Copolymers consisting of two or more constituent monomers are named by listing the monomers separated by a slash (/) followed by the word "Copolymer," e.g., Acrylates/Acrylamide Copolymer.
 - c. Copolymers consisting of four or more monomers may be given an HCPA name according to their class followed by an arbitrary number, e.g., Polyester-1 with the monomers listed in the monograph definition in alphabetical order of the material. Such nomenclature is granted at the discretion of the INC, with a purpose of shortening lengthy HCPA names.
 - d. Crosspolymers consisting of two or more constituent monomers are named by listing the monomers in alphabetical order separated by a slash (/) followed by the word "Crosspolymer," e.g., Acrylates/VA Crosspolymer. The crosslinking agent will be included in the HCPA name if the crosslinking agent is a polymer. In these cases, the crosslinking agent will appear as the last component of the HCPA name followed by the word "Crosspolymer," e.g., Adipic Acid/Diethylene Glycol/Glycerin Crosspolymer is a copolymer of diethylene glycol and adipic acid crosslinked with glycerin. When the crosslinking agent is not a polymer, it will not be included in the HCPA name, but will be included in the monograph definition of the material.
35. The term "Acrylates" is used to describe linear, non-crosslinked copolymers that contain combinations of acrylic acid, methacrylic acid, and their simple esters. Similarly, the term "Crotonates" is used to describe copolymers that contain combinations of crotonic acid and its simple esters.
36. The term "Aminoacrylates" refers to simple aminoacrylates, in which the substituted alkyl groups attached to amino nitrogen range from C1-4, and acrylates conforms to the definition as described above.
37. The name "Carbomer" is used to describe high molecular weight crosslinked homopolymers of acrylic acid. The crosslinking agent(s) are identified in the ingredient monograph definition.

Quaternary Ammonium Salts

38. Quaternary ammonium salts usually have the suffix "ium" in the stem of the cation. The term "monium" describes a monomethyl-substituted quaternary nitrogen; "dimonium" describes a dimethyl-substituted quaternary nitrogen; "trimonium" describes a trimethylsubstituted quaternary nitrogen.

Substituted Compounds

39. Singly substituted derivatives usually do not include the prefix "mono." This term is used only when required to prevent ambiguity. The absence of a suitable prefix implies "mono," e.g., Glyceryl Stearate represents glyceryl monostearate and Glyceryl Stearate/Acetate represents a monoester of glycerin with a blend of stearic and acetic acids.)

40. Multiple substitution is routinely described with the appropriate prefix, such as "di-," "tri-," or "tetra-," e.g., Glyceryl Distearate, Propylene Glycol Dilaurate, Pentaerythrityl Tetrabenzoate.
41. Mixtures of mono-, di- and tri-esters of glycerin are designated by the suffix "-ates" (e.g., Glyceryl Stearates).
42. The dimethyl term is omitted and is assumed in all alkyl dimethyl amine oxide names (e.g., Stearamine Oxide). Tertiary amine oxides with different substituent groups are named completely (e.g., Dihydroxyethyl Stearamine Oxide).