2000

Allured's Flavor and Fragrance Materials

wide reference list of materials used in compounding
lavors and fragrances, with sources of supply

Allured

Allured's Flavor and Fragrance Materials - 2000

Worldwide reference list of materials used in compounding flavors and fragrances

ISBN 0-931710-74-X

Telephone: 630-653-2155 • Fax: 630-653-2192 • e-mail: CustomerService@allured.com
www.PerfumerFlavorist.com

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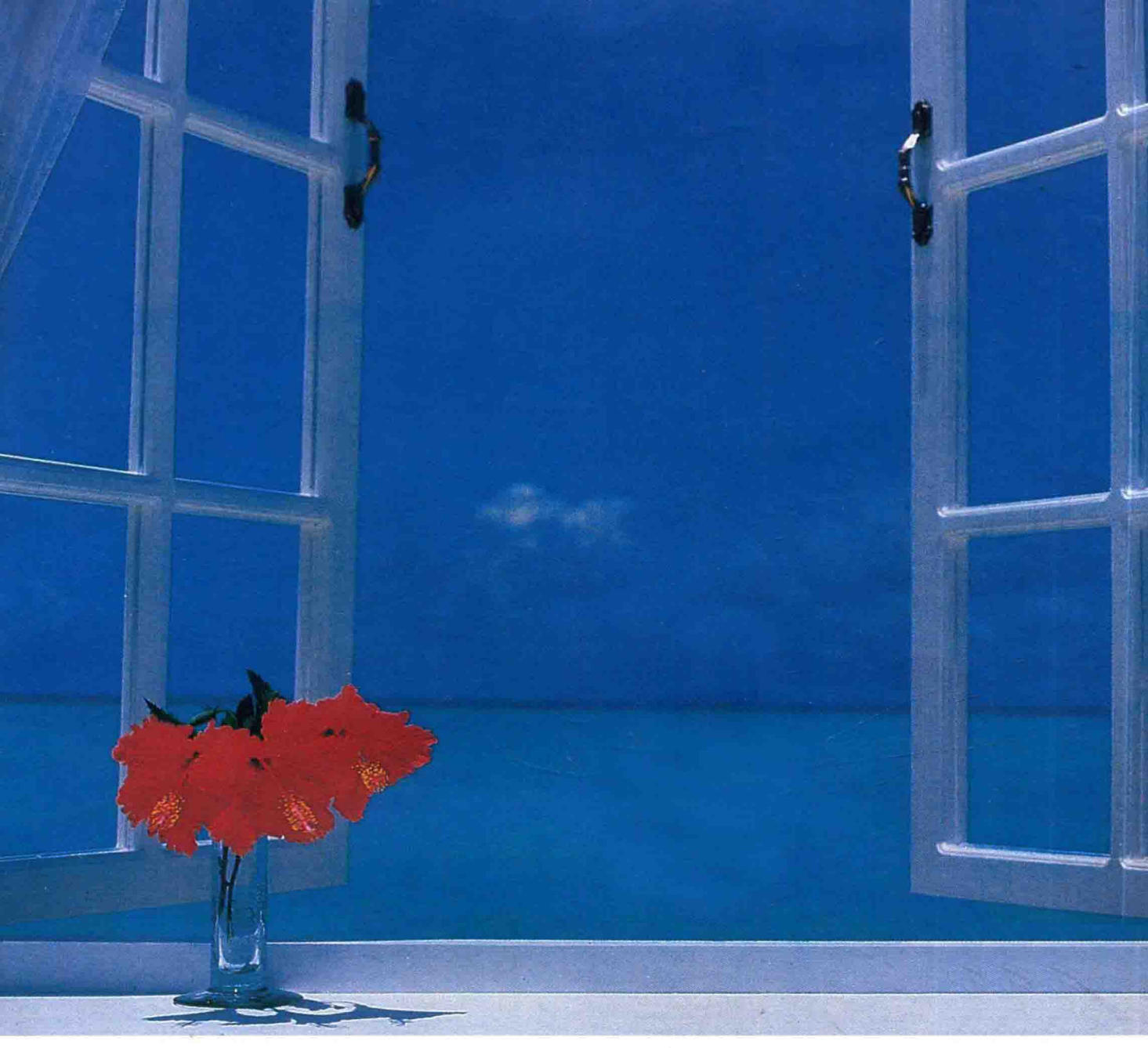

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Introduction

The large amount of data included in this reference is collected from a wide variety of sources. Most of these sources are indicated below, with the majority of the added data from the suppliers of flavor and fragrance materials listed in this publication. Since none of the data in this database originates with Allured the publisher cannot guarantee the accuracy of the data. For confirmation of the information herein, consult the original documents cited in the references.

While we have been as careful as possible in collecting the most recent data from each of these sources and placing it accurately within our database, it is inevitable that we will not have been 100% accurate. Anyone depending on the data in this publication for safety and legality should consult the original sources to determine the absolute accuracy. The publisher will be glad to discuss any apparent discrepancies or contradictions within this book with the user at any time.

This publication is the 14th in a series of publications on flavor and fragrance materials which was first published in 1977,[1] and continues to be the only comprehensive international directory of materials used in the creation of flavors and fragrances. The first compilation, containing GRAS flavor substances and much additional international regulatory and scientific information was compiled by Dr. Richard A. Ford, who was then directing the scientific work of FEMA.[10] Dr. Anne Marie Api at The Research Institute for Fragrance Materials is a very important contributor to this publication, as is Dr. John Hallagan of the Flavor and Extract Manufacturers Association, Dr. F. Grundschober of IFRA and IOFI, and many other users throughout the world. Dr. Frederick Stone, recently retired from Firmenich USA, has made a thorough review of the chemistry of products listed in this volume. As a result, a number of terms have been corrected, synonyms are now more accurate indications of the primary materials, and empirical formulas have been entered for most of the aroma chemicals listed in this volume. This review of the chemistry will be an ongoing project to provide the international flavor and fragrance industry with a comprehensive and accurate indication of the materials that are commonly in use throughout the world.

The **flavor materials** in this publication include the current materials listed in the FEMA GRAS lists through GRAS 18, the materials in the "Blue Book" of the Council of Europe, 1981 and 1992 editions and the materials in the EC database of flavoring substances published in 1999. Additional flavor materials have been included from information supplied by the Chemical Sources Association and from many users and suppliers of flavor materials.

The **fragrance materials** were compiled from the list of materials that RIFM has investigated for their safety in fragrance use, plus the list of substances for which there are published FMA standards, plus additional materials which have been submitted by fragrance companies and suppliers of fragrance materials.

One of the major tasks associated with producing a new edition of ***Allured's Flavor and Fragrance Materials*** is to survey suppliers to the industry and correct and update the products which each one supplies. We do not make any special effort to determine if a supplier is, in fact, able to supply the products that are listed. We do find that nearly all of the suppliers provide prompt and courteous service to anyone requesting information. However, if any users of this directory find that a particular supplier is not able to provide products that they have listed and does not have a satisfactory explanation, please let us know. We want to make sure that the listings placed in this directory are serious indications of true ability to supply the product named.

Anyone having knowledge of, or interest in, flavor and fragrance materials is aware of at least two major problems with a list such as this. First, a substance may be referred to or identified by a multitude of different terms or names. Second, a single name or term may be employed for a variety of separate and distinct substances. We have tried to identify each individual material by its most widely known name, and separately list all of its popular synonyms and trade names. We have also tried to separate into individual listings any variations of a single material when the identity is significantly different. However, it is never possible to resolve these problems to everyone's satisfaction. If any glaring errors in names or data are found, we ask that they be brought to the attention of the editors. The following chart will be of help in locating alternate names for materials

Bell Aromatics

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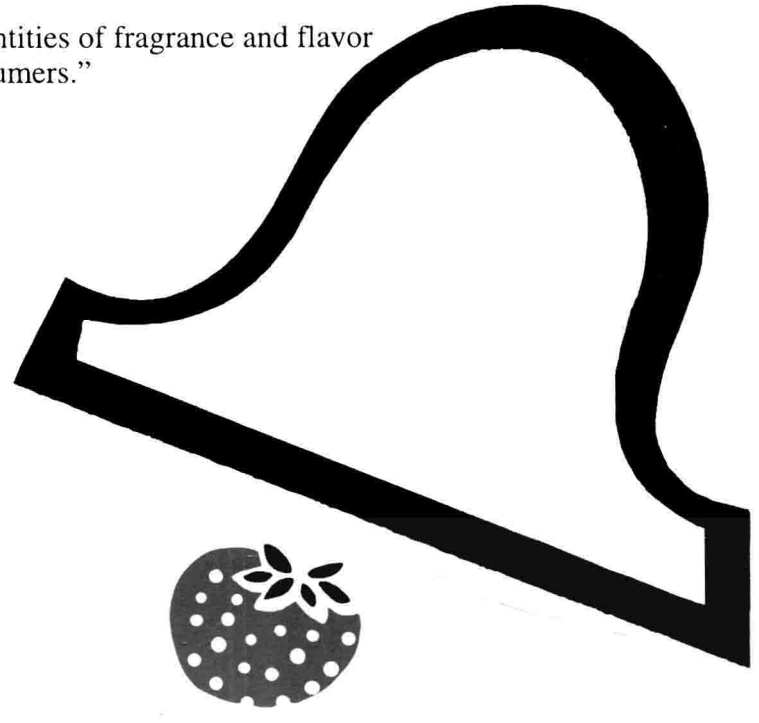

Suppliers of:

Caffeine
Heliotropin
Methyl Anthranilate
Dimethyl Anthranilate
Aconitic Acid
Butyl Butryl Lactate
Coffee Mercaptan
Ethyl Crotonate
Ethyl Oxyhydrate

Aroma Chemicals

Furfuryl Acetate
Leaf Alcohol & Esters
Pineapple Mercaptan
Racemic Acid
Rum Ether
Schiff's Bases

BELLarome SPECIALTIES

Bitter Almond Oil
Butter Derivatives (Acids)
Butter Esters
CBA: Capryl Butyric Acid
Coumasyn
Geranium Bourbon F.B.
Leather Cuirome
Musc F.B.
Rhodinol Synfleur
Sandalwood Reco
Synkafe
Terpenless Oils
Tonkasyn
Vanasyn
Vanillodeur

*** New ***

Flora –G®
(n-Acetyl Methyl Anthranilate)
Cameone®
(Heliotropyl Acetone)
Natural Aroma Chemicals

Natural Chemicals

Natural Acetic Acid
Natural Acetaldehyde 50% Alcohol
Natural Benzaldehyde
Natural Butyl Butryl Lactate
Natural Cis-3-Hexenol 90+%
Natural Cis-3-Hexenyl Acetate
Natural Dimethyl Sulfide 95%
(other concentrates are available)
Natural Ethyl Caproate
Natural Furalon 100%
(4-Hydroxy-2,5-Dimethyl-3 (2H) Furanone)
(other concentrates are available)
Natural Geranyl Butyrate
Natural Heliotropine (Crystal)
Natural Hexanol
Natural Lactones
-Natural Decalactone Delta
-Natural Decalactone Gamma
-Natural Dodecalactone Delta
-Natural Octalactone Gamma
-Natural Undecalactone Gamma
Natural Methyl Anthranilate
Natural Methyl Butyric Acid-2
Natural Methyl Ketone Mixture
Natural Oil of Bitter Almond
Natural Raspberry Ketone
(Para hydroxy Phenyl Butanone)
Para Mentha 8-Thiol-3-One-5%
Ethanol
2,4 Decadienal –10% Ethanol

*** New Natural Chemicals ***

Natural Geranyl Acetate
Natural Neryl Acetate 90%

Natural Botanicals

Carob Extract
Coffee Blanche
Cicia Blanche
Deertongue Oleoresin
Hickory Smoke Concentrate
Quillaia Extract
Sweet Gum (Styrax)
Tobacco Resinoids
Tonka Absolute
Vanilla Oleoresin
Yucca Foam

Bell Aromatics ▪ 500 Academy Drive ▪ Northbrook, IL 60062
847-291-8300 ▪ 800-323-4387 ▪ Fax: 847-291-1217

Radicles chart

Radicle Synonyms	
dl-	*racemic-*
Allyl-	2-Propencyl-
Allyl-	Vinyl carbinyl-
alpha-Toluyl-	Phenylacetyl-
alpha-Tolyl-	Benzyl-
Amyl-	Pentyl-
-anisate	-*para*-methoxybenzoate
-anthranilate	-*ortho*-aminobenzoate
Anisal-	*para*-Methoxybenzyl-
Methoxyphenyl-	
Benzal-	Benzylidene-
Benzene	Benzol
Benzylcarbinyl-	Phenylethyl-
	Phenethyl-
-butanoate	-butyrate
Capryl-	Octyl-
Carvacryl-	*2-para*-Cymyl-
Cetyl-	Hexadecyl-
Cinnamal-	Cinnamylidene- (aldehyde)
Cinnamenyl-	Styryl-
Cresoxy-	Toloxy-
Cyclohexyl-	Cyclohexan(yl)-
Cyclohexyl-	Hexhydrophenyl-
-decanoate	-caprate
-decanoate	-caprinate
-decanoate	-decylate
-dodecanoate	-dodecylate
-dodecanoate	-laurate
-dodecanoate	-laurinate
-ethanoate	-acetate
Ethenyl-	Vinyl-
Ethinyl-	Ethynyl-
Furfural-	Furfurylidene-
Glycerin	Glycerol
Guaiacyl-	*ortho*-Methoxyphenyl-
Heliotropyl-	Piperonyl-
Heliotropylidene-	Piperonal-
Hendecyl-	Undecyl-
-heptanoate	-heptoate
-heptanoate	-heptylate
-hexanoate	-caproate
-hexanoate	-capronate
-hexanoate	-hexoate
-hexanoate	-hexylate
Hydrocinnamyl-	Phenylpropyl-
Iso-Butenyl-	2-Methylpropenyl-
Lauryl-	Dodecyl-
-methanoate	-formate
Methylol-	Hydroxymethyl-
Myristyl-	Tetradecyl-
-nonanoate	-nonylate
-nonanoate	-pelargonate
-octanoate	-caprylate
-octanoate	-octoate
-octanoate	-octylate
Oenanthylidene-	Heptylidene-
Pelargonyl-	Nonyl-
-pentanoate	-valerate
-pentanoate	-valerianate
-phenylacetate	-*alpha*-toluate
-phenylpropionate	-hydrocinnamate
-propanoate	-propionate
Pyrocatechin	Catechol
Pyrocatechin	Pyrocatechol
-salicylate	-*ortho*-hydroxybenzoate
-tetradecanoate	-myristate
-tetradecanoate	-tetradecylate
Salicyl-	*ortho*-Hydroxybenzyl-
Thiohydroxy-	Mercapto-
Thionyl-	Sulfinyl-
Toluene	Toluol
-undecanoate	-hendecanoate
-undecanoate	-undecylate
Vanillal-	Vanillylidene-
Xylene	Xylol

In compiling the listings in ***FFM***, we have kept in mind the needs of the ultimate reader and have collected together various trade names, trivial names in common usage, and conventional chemical names without regard to systems of nomenclature. However, within each system of nomenclature we have tried to be consistent. We have avoided the use of transposed names such as "acetic acid, ethyl ester"; their structure is arbitrary (consider "ethyl alcohol, acetic acid ester") and their inclusion would lead to an unwieldy compilation. In naming acetals we have employed the convention of naming the parent aldehyde followed by the alcohol(s) used to make the acetal and the word acetal. Because ***FFM*** lists materials alphabetically, all of the acetals of a given aldehyde are grouped together. Schiff bases are named as Schiff base followed by the name of the aldehyde portion, then a slash followed by the name of the amine portion. When alphabetized, all of the **Schiff bases** can be found together. Natural products are identified by name and by botanical or zoological genus and species of the source.

SAF - ISIS

Biotechnology for Natural Flavors

NATURAL AROMA CHEMICALS

natural acids
2-Methyl-butyric acid
Isobutyric acid
Isovaleric acid
Formic acid
Propionic acid
Succinic Acid NEW!

natural esters
Ethyl 2-methyl-butyrate
Ethyl formate
Ethyl isobutyrate
Ethyl isovalerate
Ethyl Hexanoate NEW!
Ethyl propionate
Geranyl butyrate
Hexyl acetate
Hexyl butyrate
Isoamyl 2-methyl-butyrate
Isoamyl butyrate
Isoamyl isobutyrate
Isoamyl isovalerate
Isoamyl propionate
Phenethyl acetate
Phenethyl caprylate
Phenethyl isovalerate NEW!

natural aldehydes
Acetaldehyde
Acetaldehyde in orange terpenes
Hexanal (*aldehyde C6*)

natural lactones
γ-Decalactone
Cis-6-dodecen-γ-lactone NEW!

natural alcohols
Phenethyl alcohol

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400 South 4th Street - Suite 310
Minneapolis, MN 55415 (USA)
Tel (612) 373-4292 - fax (612) 338-1985
dpujol@lsaf.com / WWW.SAFISIS.COM

Zone Artisanale-40110 Soustons France
Tel : 05 58 41 34 01 (33 5 58 41 34 01)
Fax : 05 58 41 50 25 (33 5 58 41 50 25)

lesaffre

Natural materials are generally listed as **"oil"** or **"distillate"** when the material is derived from the natural material by distillation. We do not attempt to further divide these products with such terms as "decolour, etc. Exceptions are the citrus oils, orange, lemon, grapefruit, etc., where the oil is usually derived by cold pressing the whole fruit or only the peel.

"Extracts," "oleoresins" and "absolutes" are normally derived from the natural material by solvent extraction with such solvents are water, alcohol, hexane, methylene chloride, carbon dioxide, and a variety of other solvents. Technical and olfactory requirements of many applications are such that natural materials are often designed for specific uses through the use of a combination of the above processes.

Citrus oils and some other natural oils and extracts are often further processed, by either distillation or now sometimes by extraction, to produce "deterpinated" or "terpeneless" oils. The resulting oils have greater stability with nearly the same level of taste and odor as the original material. The resulting terpenes have special uses, generally for special fragrance applications.

Using the Alphabetical Listing Section

The **first column** following the principal name gives the reference number assigned to the substance in one of the following FEMA GRAS lists beginning in 1965. GRAS 19 is scheduled for publication in 2000, but had not appeared at the time of this publication.

2001-3124, GRAS 3	1965
3125-3249, GRAS 4	1970
3250-3325, GRAS 5	1972
3326-3390, GRAS 6	1973
3391-3423, GRAS 7	1973
3424-3444, GRAS 8	1974
3445-3475, GRAS 9	1975
3476-3525, GRAS 10	1976
3526-3596, GRAS 11	1978
3597-3650, GRAS 12	1979
3651-3739, GRAS 13	1984
3740-3754, GRAS 14	1985
3755-3774, GRAS 15	1990
3775-3796, GRAS 16	1993
3797-3815, GRAS 17	1996
3816-3905, GRAS 18	1998

A particular problem of identity occurs with some FEMA materials in which the original name was not specific with regard to isomer and the CAS number is equally nonspecific. Now that essentially pure isomers are available, should these also be included under the same FEMA number? We have taken what we feel is the reasonable position that any portion of a material that is GRAS is itself also GRAS. An example is FEMA 3170, 3-hexenoic acid with CAS #4219-24-3. This name and CAS number are nonspecific. We also list trans-3-hexenoic acid, CAS #1577-18-0, as FEMA 3170.

The **second column** refers to the section in Title 21 of the *Code of Federal Regulations* of the United States Government where the substance is listed for use in flavors.[2]

The **third column** gives the identifying number of a material if it was listed in either the third edition (1981) or in the fourth edition (1992) of the Council of Europe Report, *Flavouring Substances and Natural Sources of Flavourings*.[3] The third edition carried lists of both natural sources of flavoring and of chemicals used in flavoring. The fourth edition revised the chemical substances and those revisions are generally included in this listing. No changes were made in the natural sources of flavorings and, therefore, those materials are indicated from the third edition. Unfortunately, the same numbering system was used for both natural materials and chemicals. Therefore, on this list a **"n" follows the names of natural** sources of flavorings and a **"c" follows the number for chemical substances**. All numbers greater than 10,000 are chemical substances.

The **fourth column** indicates by an "X" that the material in included in the European Commission database on chemically defined flavoring substances. This database is made up of lists of flavor materials provide by the member states of the EC and compiled by the EC commission staff. These flavor materials are under review, and a final approved list is expected to be adopted in two or three years.

The **fifth column** indicates the category of flavoring substances. The division of flavoring substances into the categories of natural, nature-identical, and artificial was proposed by the International Organization of the Flavor Industry (IOFI) and has been adopted by the FAO/WHO Food Standard Programme, the Codex Alimentarius Commission.[4,5] The definitions for the classes of flavoring substances, indicated by the numbers 1, 2, 3 or 4, are as follows:

1. Natural Flavors and Natural Flavoring Substances. For the purpose of the Codex Alimentarius, "natural flavors" and "natural flavoring substances" are preparations and single substances, respectively, acceptable for human consumption, obtained exclusively by physical processes from vegetable and sometimes animal raw materials either in their natural state or as traditionally processed for human consumption.
2. Nature-Identical Flavoring Substances. For the purpose of the Codex Alimentarius, "nature-identical flavoring substances" are substances chemically isolated from aromatic raw materials or obtained synthetically; they are chemically identical to substances present in natural products intended for human consumption, either processed or not, as defined in (1.) above..
3. Artificial Flavoring Substances. For the purpose of the Codex Alimentarius, "artificial flavoring substances" are those substances which have not yet been identified in natural products intended for human consumption, either processed or not.
4. An additional category of flavoring substances is defined in Article V of the EC Council Directive of 22 June 1988 on Flavorings. This category deals with flavoring substances that are chemically identical to flavoring substances naturally present in vegetable or animal raw materials that are not normally considered as human foods. These substances have been previously classified as artificial. When these substances are used in flavors, the flavoring material may be labeled "nature identical."

The appetite for "natural" on the part of consumers and food processors has spawned a highly creative series of processes in order to place the label "natural" on products that differ very little, if any, from the same material produced by traditional chemical processes.

The **sixth column** and **seventh columns** give Chemical Abstracts Service (CAS) numbers for the substance. A number is assigned by CAS to each material that appears in the literature and this number is becoming widely used as prime identification of chemical and natural materials. An additional CAS number may also be applicable. This may be due to its isomeric form, or there may be a question of the exact structure. In the case of natural materials, there are differences in the CAS number where it is common in Europe to give a CAS number that represents any derivative from a specific botanical product. Whereas, in the United States there are often individual CAS numbers for derivatives from different parts of the plant, such as leaves, wood, roots, flowers, etc.

The **eighth column** contains the number assigned to this material on the Eurpoean Inventory of Existing Chemical Substances (EINECS). This list is now closed and has been published, and as new chemicals are registered they will appear on the European List of Notified Chemical Substances (ELINCS). However, the ELINCS list has not yet been published.

The **ninth column** gives the **IFRA** reference in the *Code of Practice* of the International Fragrance Association. These guidelines give the IFRA recommendations for the safe use of fragrance materials based on the latest research information available from published and unpublished worldwide sources of adverse reactions to the use of fragrance materials. **"R"** (Restricted) indicates that the guidelines restrict the use of the material by placing quantitative limits on its use, by placing qualitative limits on its purity criteria, or requires that it be used in conjunction with other materials. **"P"** (Prohibited) indicates that IFRA has found that the use of this material presents an unacceptable risk to the health and safety of consumers and, therefore, must not be used in any fragrance product.

Added Information:

Safety ref: indicates a review of the literature on the safety tests on this materialfor use in flavors has been published on this material. Codes beginning "A" through "M" are **Scientific Literature Reviews (SLR)** in which the literature on the substance is reviewed. These SLRs are available either paper bound or on microfiche from the Customer Service department of National Technical Information Services (NTIS), 5285 Port Royal Road, Springfield, VA 22161, telephone 703-487-4660. A list of these numbers is shown after this introduction for use in ordering. However, these SLRs have not been updated for several years. They are being replaced by more recent literature reviews and safety evaluations in a program initiated by FEMA titled GRASr (GRAS reaffirmation). This is a series of publications that report on comprehensive reevaluations of GRAS flavor ingre-

dients. **"R"** refers to the literature references below where the scientific studies of the safety of individual materials have been published. As the expert panel of FEMA continues this program, the original Scientific Literature Reviews will be superseded by these new reviews that include more recent publications and more recent techniques of safety evaluation.

R1 - Adams, T. B., et al., The FEMA GRAS Assessment of Alicyclic Substances Used as Flavour Ingredients, *Food and Chemical Toxicology*, Vol. 34, No. 9, pp. 763-828
R2 - Adams, T. B., et al., The FEMA GRAS Assessment of Furfural Used as a Flavour Ingredients, *Food and Chemical Toxicology*, Vol. 35, No. 8, pp. 739-751
R3 - Adams, T. B., et al., The FEMA GRAS Assessment of Lactones Used as Flavour Ingredients, *Food and Chemical Toxicology*, Vol. 36, No. 4, pp. 249-278

RIFM indicates that a monograph on the safety of this material for fragrance use has appeared in the series published by the Research Institute for Fragrance Materials.[7]

FCC indicates that the substance appears among the monographs published in the fourth edition of the Food Chemicals Codex.[6]

FMA indicates there is a standard for the material published by the Fragrance Materials Association.[8]

ISO indicates that there is a standard published by the International Standards Organization for this product. For full details of ISO activities and standards, contact your national standards organization or direct to the ISO Central Secretariat, 1, rue de Varembé, CH-1211, Geneva 20, Switzerland.

Flash Pt. gives theflash point which has been in a published and unpublished sources, including manufacturers' Material Safety Data Sheets, sales and specification literature, and product catalogs, as well as handbooks and indexes. The data is given in Fahrenheit or Celsius, depending on the source.No attempt has been made to convert these data to a single scale but we are gradually moving toward an entirely Celsius scale. Flash points for individual materials are given as reported in sources mentioned above, either in °F or °C. The flash points of salts, high-melting solids, and solids which decompose at their melting points are frequently reported as "none." In other instances the flash points of solid materials, which do not flash below a given threshold, are reported as "greater than" the threshold. As indicated above, these have been incorporated "as is" in this compendium. Flash points, unlike other physical properties, are measurements made on systems which are not at equilibrium, and are highly influenced by small levels of impurities, and testing method. Consequently, the measurements can vary significantly based on equipment variation, operator measurement techniques, variations in atmospheric pressure, etc. Consequently, the flash points reported in this compendium should be considered to be approximate. Request specific data from you supplier for the most accurate information.

H No. gives the Harmonized System Classification number that is used for classifying traded products. The complete number is ten digits. The six digits given are the first part of the complete number, and is the part that is uniformly used throughout the world. The four additional digits are unique to each country and determined by that country for its own internal statistical purposes. For this reason, only the first six digits, which are uniform throughout the world, are included in this publication.

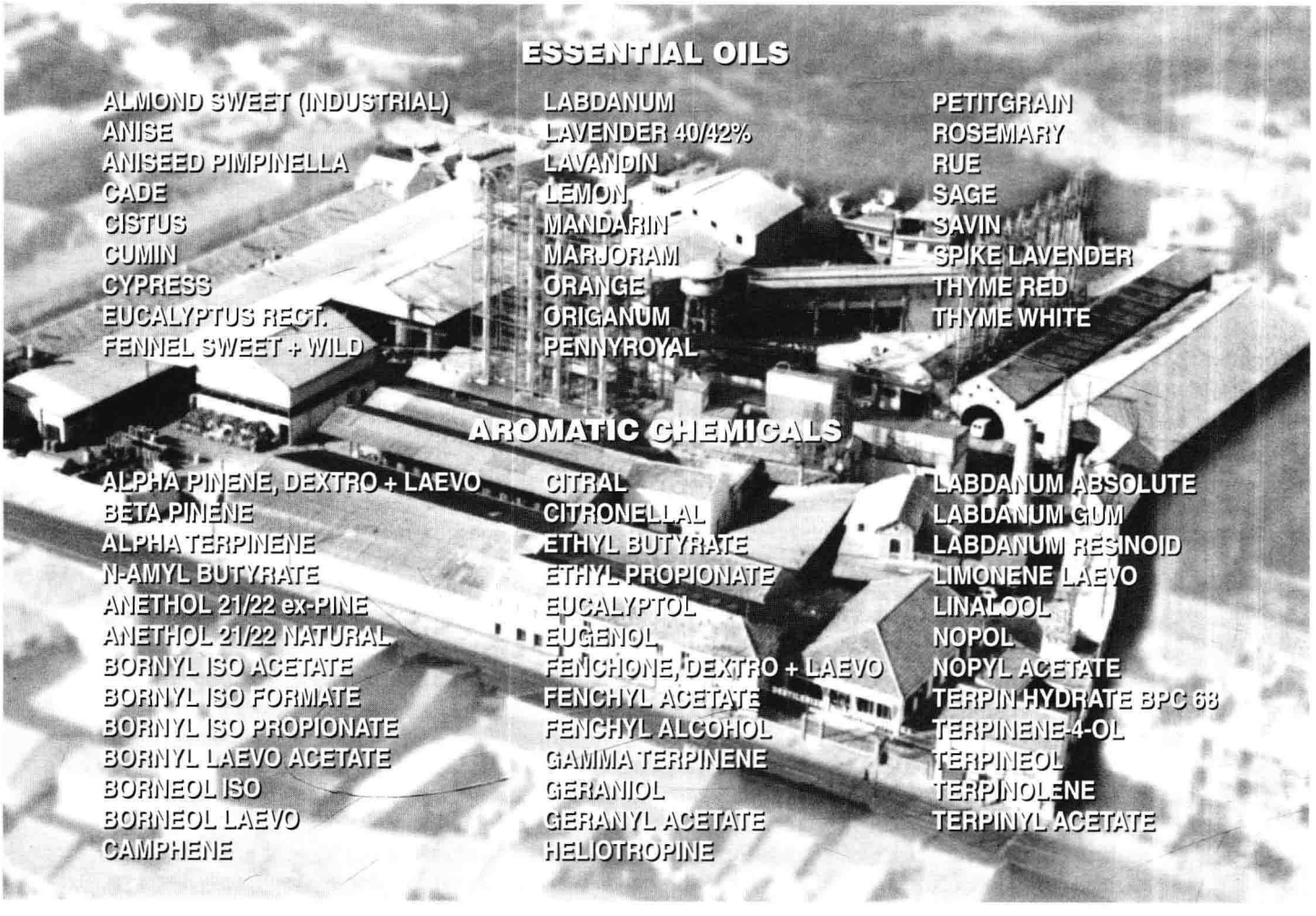
Suppliers of both flavor and fragrance materials have been listed. Our aim is to provide a complete worldwide source list for all these materials. Any information that our readers may be able to contribute will be greatly appreciated.

This publication is intended to aid in the search for a particular substance in one of the categories mentioned above. Although a reasonable effort was made to find all listings, it is probable that some were missed. Accurate cross-referencing was difficult. This is especially true of the botanicals. In this case, it was assumed that where the species were the same on two or more reference lists, the substance was the same unless it was clearly differentiated by reference to a particular part of the plant, i.e., roots on one list and leaves on another, etc.

It is important, therefore, to emphasize that if accuracy is critical, the original reference should be consulted for verification. If you find any errors in this edition, it would be greatly appreciated if you would let us know so corrections can be made in the next edition.

Cosmetic Materials

A publication similar in style and design to ***Allured's Flavor & Fragrance Materials***, covering cosmetic raw materials, is called ***Cosmetic Bench Reference***. For a description and order form for the ***Cosmetic Bench Reference***, write to Allured Publishing Corporation, 362 South Schmale Road, Carol Stream IL 60188 USA.



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Fax: (68) 34 15 62
Telex: 67038 MUGAL E

References

1. R. A. Ford and G. M. Cramer, Reference list of flavouring substances in use in the United States. *Perf. & Flav.*, **2**(1) 1 (1977)
2. Title 21, *Code of Federal Regulations.* Order from the U.S. Government Printing Office, Superintendent of Documents, Mail Stop SSOP, Washington, DC 20402-9328. Communicate with the Food and Drug Administration at FDA (HFE-88), 5600 Fishers Lane, Rockville, MD 20857. Website: www.fda.gov
3. Council of Europe, BP 432 R6, F-67075 Strasbourg, France, *Flavouring Substances and Natural Sources of Flavourings*, Strasbourg (1992)
4. F. Grudschober, R. L. Hall, J. Stofberg and C. A. Vodoz, Survey of worldwide use levels of artificial flavouring substances. *Flavours*, pp 223-230 (1975)
5. *Guide to the Safe Use of Food Additives*, FAO, CAC/FAL 5, p 6 (1979)
6. *Food Chemicals Codex*, 4th Edition, 1996. National Academy Press, 2101 Constitution Avenue NW, Washington, DC 20418. http://www.nas.edu/codex
7. Research Institute for Fragrance Materials, 2 University Plaza Dr., Suite 406, Hackensack, NJ 07601 USA
8. Fragrance Materials Association of the United States, 1620 I Street NW, Suite 925, Washington, DC 20006, telephone 202/293-5800, fax 202/463-8998
9. International Fragrance Association, 8 rue Charles-Hubert, CH-1205 Geneva, Switzerland

Industry Associations

American Botanical Council
P.O. Box 144345
Austin, TX 78714-4345
Telephone: 512-926-4900; Fax: 512-926-2345
Web site: www.herbalgram.org

American Society of Perfumers
P. O. Box 1551
West Caldwell, NJ 07004 USA
Telephone: 201-750-2180; Fax: 201-750-1940

ASTA (American Spice Trade Association)
560 Sylvan Avenue
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FAFAI (Fragrances & Flavours Association of India)
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IFT (Institute of Food Technologists)
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NAFFS (National Association of Fruits, Flavors & Syrups, Inc.)
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Scientific Literature Reviews

SLR Code	Title	Number of Substances Covered	Order No.
A1	Aliphatic ketones, secondary alcohols and related esters	67	PB85141059/LL
A2	Tertiary alcohols and related esters	11	PB265-513/AS
A3	Aliphatic acetals	9	PB265-514/AS
A5	Alicyclic compounds of carbon, hydrogen and oxygen	133	PB86-155835/LL
A6	Aliphatic hydrocarbons	16	PB265-516/AS
A7	Aliphatic amines	3	PB265-517/AS
A8	Aliphatic thiols	10	PB85141075/LL
B1A	Propylene glycol, glycerol and related substances	36	PB86-155843/LL
B1B	Aliphatic keto- and hydroxy-acids with oxygen functions and related compounds	26	PB85141091/LL
B1C	Aliphatic lactones	33	PB86-155850/LL
B1D	Aliphatic di- and tri-carboxylic acids and esters	16	PB265-522/AS
B1E	Diketones, hydroxyketones and simple derivatives	14	PB265-523/AS
B1F	Aliphatic poly-hydroxy compounds and derivatives	5	PB85-141117/LL
B2	Alicyclic "dicarbonyl" compounds	12	PB265-525/AS
B3	Amino acids	15	PB85141125/LL
B4	Aliphatic mono-, di- and trisulfides	20	PB85141133/LL
B5A	Primary alcohols, aldehydes, acids and related esters with thiol or sulfide functions	17	PB85141141/LL
B5B	Selected oxygenated derivatives of mercaptans and sulfides	14	PB85141158/LL
B5C	Aliphatic thio esters	5	PB85141265/LL
B6	Substituted pyrazines	34	PB85141174/LL
C1	Piperonal and related substances	5	PB283-499/AS
C2	Aromatic hydrocarbons	7	PB291-111/AS
C3	Salicylates and salicylaldehyde	10	PB85141182/LL
C4	Aryl substituted tertiary alcohols and esters	10	PB85141190/LL
C5	Aromatic thiols and sulfides	11	PB85141208/LL
C6	Phenethyl alcohol and related compounds	41	PB291-114/AS
C7	Fused ring aromatic lactones	5	PB283-502/AS
C8	Eugenol and related substances	12	PB283-501/AS
C9	Benzyl alcohol, benzaldehyde, benzoic acid and related compounds	32	PB85141216/LL
C10	3-Phenyl-1-propanol and related substances	11	PB283-504/AS
C11	Cinnamyl alcohol and related substances	31	PB284-961/AS
C12	Phenols	46	PB86-155868/AS
C13	Acetophenones and related substances	14	PB291-105/AS
C14	Aryl substituted secondary alcohols, ketones and derivatives	24	PB284-963/AS
C15	Aryl substituted primary alcohols, aldehydes and related esters	21	PB283-506/AS
C16	a-Alkylcinnamaldehydes and related substances	10	PB283-505/AS
C17	Epoxides	7	PB291-103/AS
C18	Vanillin and derivatives	4	PB86-155876/AS
C19	Substituted benzaldehydes and related compounds	19	PB86-155884/LL
C20	Phenoxyacetic acid and related compounds	5	PB283-507/AS
C21	Capsaicin and related compounds	2	PB284-868/AS
C22	Aromatic ethers	9	PB284-867/AS
C23	Anisole and derivates	11	PB284-962/AS
D1	Dithiols and related substances	10	PB291-113/AS
D2	Pyridine and related substances	15	PB86-155892/AS
D3	Pyrrole and related substances	10	PB296-007/AS
D4	Anthranilates	14	PB291-112/AS
D5	Furfuryl alcohol and related substances	20	PB291-104/AS
D6	Furyl substituted ketones	7	PB291-109/AS
D7	Furyl substituted esters and related substances	11	PB291-110/AS
D8	Alkyl furans and benzo furans	5	PB291-108/AS
D9	Furanones and related substances	6	PB85141240/AS
D10	Tetrahydrofurfuryl alcohol and derivatives	5	PB291-117/AS
D11	Selected tetrahydrofurans	10	PB86-155900/AS
D12	Aliphatic ethers	6	PB85141166/AS

SLR Code	TITLE	Number of Substances Covered	Order No.
D13	Keto dioxanes	3	PB291-120/AS
D14	Sulfur derivatives of furans	26	PB85141273/LL
D15	Thiophene derivatives	4	PB291-102/AS
D16	Thiazole and related substances	22	PB85141281/LL
D17	Salts of carboxylic acids	4	PB296-003/AS
D18	Maltol and derivatives	3	PB296-004/AS
D19	Miscellaneous nitrogen compounds	14	PB85141299/LL
D20	Quinine salts	3	PB296-017/AS
D21	Common mixtures of aliphatic alcohols, aldehydes, acids and related esters	4	PB296-010/AS
D22	Sorbitan derivatives	5	PB296-016/AS
D23	Miscellaneous substances	7	PB86-155918
D24	Wood pyrolysates	5	PB296-015/AS
D25	Wood rosin derivatives	3	PB296-009/AS
M1	Aliphatic primary alcohols, aldehydes, esters and acids (7 volumes, 2,807 pages):	351	PB86-155926

Vol. 1	Summary of biological, physical and chemical properties; data directory
Vol. 2	Pharmacology, toxicology and metabolism
Vol. 3	Natural occurrence
Vol. 4	Natural occurrence, continued
Vol. 5	Usage
Vol. 6	Bibliography
Vol. 7	Bibliography, continued