

calculated as anhydrous sodium ferrocyanide.

[42 FR 14491, Mar. 15, 1977, as amended at 58 FR 17098, Apr. 1, 1993]

**Subpart F—Flavoring Agents and Related Substances**

**§ 172.510 Natural flavoring substances and natural substances used in conjunction with flavors.**

Natural flavoring substances and natural adjuvants may be safely used in food in accordance with the following conditions.

(a) They are used in the minimum quantity required to produce their intended physical or technical effect and in accordance with all the principles of good manufacturing practice.

(b) In the appropriate forms (plant parts, fluid and solid extracts, concretes, absolutes, oils, gums, balsams, resins, oleoresins, waxes, and distillates) they consist of one or more of the following, used alone or in combination with flavoring substances and adjuvants generally recognized as safe in food, previously sanctioned for such use, or regulated in any section of this part.

Common name	Scientific name	Limitations
Aloe .....	<i>Aloe perryi</i> Baker, <i>A. barbadensis</i> Mill., <i>A. ferox</i> Mill., and hybrids of this sp. with <i>A. africana</i> Mill. and <i>A. spicata</i> Baker.	
Althea root and flowers .....	<i>Althea officinalis</i> L.	
Amyris (West Indian sandalwood) .....	<i>Amyris balsamifera</i> L.	
Angola weed .....	<i>Roccella fuciformis</i> Ach .....	In alcoholic beverages only.
Arnica flowers .....	<i>Arnica montana</i> L., <i>A. fulgens</i> Pursh, <i>A. sororia</i> Greene, or <i>A. cordifolia</i> Hooker.	Do.
Artemisia (wormwood) .....	<i>Artemisia</i> spp .....	Finished food thujone free. <sup>1</sup>
Artichoke leaves .....	<i>Cynara scolymus</i> L .....	In alcoholic beverages only.
Benzoin resin .....	<i>Styrax benzoin</i> Dryander, <i>S. paralleloneurus</i> Perkins, <i>S. tonkinensis</i> (Pierre) Craib ex Hartwich, or other spp. of the Section <i>Anthostyrax</i> of the genus <i>Styrax</i> .	
Blackberry bark .....	<i>Rubus</i> , Section <i>Eubatus</i> ..	
Boldus (boldo) leaves .....	<i>Peumus boldus</i> Mol .....	Do.
Boronia flowers .....	<i>Boronia megastigma</i> Nees..	
Bryonia root .....	<i>Bryonia alba</i> L., or <i>B. diocia</i> Jacq .....	Do.
Buchu leaves .....	<i>Barosma betulina</i> Bartl. et Wendl., <i>B. crenulata</i> (L.) Hook. or <i>B. serratifolia</i> Willd..	
Buckbean leaves .....	<i>Menyanthes trifoliata</i> L .....	Do.
Cajeput .....	<i>Melaleuca leucadendron</i> L. and other <i>Melaleuca</i> spp.	
Calumba root .....	<i>Jateorhiza palmata</i> (Lam.) Miers .....	Do.
Camphor tree .....	<i>Cinnamomum camphora</i> (L.) Nees et Eberm .....	Safrole free.
Cascara sagrada .....	<i>Rhamnus purshiana</i> DC.	
Cassie flowers .....	<i>Acacia farnesiana</i> (L.) Willd..	
Castor oil .....	<i>Ricinus communis</i> L.	
Catechu, black .....	<i>Acacia catechu</i> Willd..	
Cedar, white (aborvitae), leaves and twigs .....	<i>Thuja occidentalis</i> L .....	Finished food thujone free. <sup>1</sup>
Centuary .....	<i>Centaurium umbellatum</i> Gilib .....	In alcoholic beverages only.
Cherry pits .....	<i>Prunus avium</i> L. or <i>P. cerasus</i> L .....	Not to exceed 25 p.p.m. prussic acid.
Cherry-laurel leaves .....	<i>Prunus laurocerasus</i> L .....	Do.
Chestnut leaves .....	<i>Castanea dentata</i> (Marsh.) Borkh.	
Chirata .....	<i>Swertia chirata</i> Buch.-Ham .....	In alcoholic beverages only.
Cinchona, red, bark .....	<i>Cinchona succirubra</i> Pav. or its hybrids .....	In beverages only; not more than 83 p.p.m. total cinchona alkaloids in finished beverage.
Cinchona, yellow, bark .....	<i>Cinchona ledgeriana</i> Moens, <i>C. calisaya</i> Wedd., or hybrids of these with other spp. of <i>Cinchona</i> ..	Do.
Copaiba .....	South American spp. of <i>Copaifera</i> L.	
Cork, oak .....	<i>Quercus suber</i> L., or <i>Q. occidentalis</i> F. Gay .....	In alcoholic beverages only.
Costmary .....	<i>Chrysanthemum balsamita</i> L .....	Do.
Costus root .....	<i>Saussurea lappa</i> Clarke..	
Cubeb .....	<i>Piper cubeba</i> L. f..	
Currant, black, buds and leaves .....	<i>Ribes nigrum</i> L.	
Damiana leaves .....	<i>Turnera diffusa</i> Willd.	
Davana .....	<i>Artemisia pallens</i> Wall..	
Dill, Indian .....	<i>Anethum sowa</i> Roxb. ( <i>Peucedanum graveolens</i> Benth et Hook., <i>Anethum graveolens</i> L.)	
Dittany (fraxinella) roots .....	<i>Dictamnus albus</i> L .....	Do.

Common name	Scientific name	Limitations
Dittany of Crete .....	<i>Origanum dictamnus</i> L.	
Dragon's blood (dracorubin) .....	<i>Daemonorops</i> spp.	
Elder tree leaves .....	<i>Sambucus nigra</i> L. ....	In alcoholic beverages only; not to exceed 25 p.p.m. prussic acid in the flavor.
Elecampane rhizome and roots .....	<i>Inula helenium</i> L. ....	In alcoholic beverages only.
Elemi .....	<i>Canarium commune</i> L. or <i>C. luzonicum</i> Miq.	
Erigeron .....	<i>Erigeron canadensis</i> L.	
Eucalyptus globulus leaves .....	<i>Eucalyptus globulus</i> Labill.	
Fir ("pine") needles and twigs .....	<i>Abies sibirica</i> Ledeb., <i>A. alba</i> Mill., <i>A. sachalinensis</i> Masters or <i>A. mayriana</i> Miyabe et Kudo.	
Fir, balsam, needles and twigs .....	<i>Abies balsamea</i> (L.) Mill.	
Galanga, greater .....	<i>Alpinia galanga</i> Willd .....	Do.
Galbanum .....	<i>Ferula galbaniflua</i> Boiss. et Buhse and other <i>Ferula</i> spp.	
Gambir (catechu, pale) .....	<i>Uncaria gambir</i> Roxb..	
Genet flowers .....	<i>Spartium junceum</i> L.	
Gentian rhizome and roots .....	<i>Gentiana lutea</i> L.	
Gentian, stemless .....	<i>Gentiana acaulis</i> L. ....	Do.
Germander, chamaedrys .....	<i>Teucrium chamaedrys</i> L. ....	Do.
Germander, golden .....	<i>Teucrium polium</i> L. ....	Do.
Guaiac .....	<i>Guaiacum officinale</i> L., <i>G. santum</i> L., <i>Bulnesia sarmienti</i> Lor.	
Guarana .....	<i>Paullinia cupana</i> HBK..	
Haw, black, bark .....	<i>Viburnum prunifolium</i> L..	
Hemlock needles and twigs .....	<i>Tsuga canadensis</i> (L.) Carr. or <i>T. heterophylla</i> (Raf.) Sarg.	
Hyacinth flowers .....	<i>Hyacinthus orientalis</i> L.	
Iceland moss .....	<i>Cetraria islandica</i> Ach .....	Do.
Imperatoria .....	<i>Peucedanum ostruthium</i> (L.). Koch ( <i>Imperatoria ostruthium</i> L.).	
Iva .....	<i>Achillea moschata</i> Jacq .....	Do.
Labdanum .....	<i>Cistus</i> spp..	
Lemon-verbena .....	<i>Lippia citriodora</i> HBK .....	Do.
Linaloe wood .....	<i>Bursera delpechiana</i> Poiss. and other <i>Bursera</i> spp..	
Linden leaves .....	<i>Tilia</i> spp .....	Do.
Lovage .....	<i>Levisticum officinale</i> Koch.	
Lungmoss (lungwort) .....	<i>Sticta pulmonacea</i> Ach.	
Maidenhair fern .....	<i>Adiantum capillus-veneris</i> L. ....	Do.
Maple, mountain .....	<i>Acer spicatum</i> Lam..	
Mimosa (black wattle) flowers .....	<i>Acacia decurrens</i> Willd. var. <i>dealbata</i> ..	
Mullein flowers .....	<i>Verbascum phlomoides</i> L. or <i>V. thapsiforme</i> Schrad.	Do.
Myrrh .....	<i>Commiphora molmol</i> Engl., <i>C. abyssinica</i> (Berg) Engl., or other <i>Commiphora</i> spp.	
Myrtle leaves .....	<i>Myrtus communis</i> L. ....	Do.
Oak, English, wood .....	<i>Quercus robur</i> L. ....	Do.
Oak, white, chips .....	<i>Quercus alba</i> L..	
Oak moss .....	<i>Evernia prunastri</i> (L.) Ach., <i>E. furfuracea</i> (L.) Mann, and other lichens.	Finished food thujone.
Olibanum .....	<i>Boswellia carteri</i> Birdw. and other <i>Boswellia</i> spp.	
Opopanax (bisabolmyrrh) .....	<i>Opopanax chironium</i> Koch (true opopanax) of <i>Commiphora erythraea</i> Engl. var. <i>liabrescens</i> .	
Orris root .....	<i>Iris germanica</i> L. (including its variety <i>florentina</i> Dykes) and <i>I. pallida</i> Lam.	
Pansy .....	<i>Viola tricolor</i> L. ....	In alcoholic beverages only.
Passion flower .....	<i>Passiflora incarnata</i> L.	
Patchouly .....	<i>Pogostemon cablin</i> Benth. and <i>P. heyneanus</i> Benth.	
Peach leaves .....	<i>Prunus persica</i> (L.) Batsch .....	In alcoholic beverages only; not to exceed 25 p.p.m. prussic acid in the flavor.
Pennyroyal, American .....	<i>Hedeoma pulegioides</i> (L.) Pers.	
Pennyroyal, European .....	<i>Mentha pulegium</i> L.	
Pine, dwarf, needles and twigs .....	<i>Pinus mugo</i> Turra var. <i>pumilio</i> (Haenke) Zenari.	
Pine, Scotch, needles and twigs .....	<i>Pinus sylvestris</i> L.	
Pine, white, bark .....	<i>Pinus strobus</i> L. ....	In alcoholic beverages only.
Pine, white oil .....	<i>Pinus palustris</i> Mill., and other <i>Pinus</i> spp..	
Poplar buds .....	<i>Populus balsamifera</i> L. ( <i>P. tacamahacca</i> Mill.), <i>P. candicans</i> Ait., or <i>P. nigra</i> L.	Do.
Quassia .....	<i>Picrasma excelsa</i> (Sw.) Planch, or <i>Quassia amara</i> L.	

Common name	Scientific name	Limitations
Quebracho bark	<i>Aspidosperma quebracho-blanco</i> Schlecht, or ( <i>Quebrachia lorentzii</i> (Griseb)).	<i>Schinopsis lorentzii</i> (Griseb.) Engl.
Quillaia (soapbark)	<i>Quillaja saponaria</i> Mol.	In alcoholic beverages only.
Red saunders (red sandalwood)	<i>Pterocarpus san alinus</i> L	
Rhatany root	<i>Krameria triandra</i> Ruiz et Pav. or <i>K. argentea</i> Mart.	
Rhubarb, garden root	<i>Rheum rhaponticum</i> L	Do.
Rhubarb root	<i>Rheum officinale</i> Baill., <i>R. palmatum</i> L., or other spp. (excepting <i>R. rhaponticum</i> L.) or hybrids of <i>Rheum</i> grown in China.	
Roselle	<i>Hibiscus sabdariffa</i> L	Do.
Rosin (colophony)	<i>Pinus palustris</i> Mill., and other <i>Pinus</i> spp	Do.
St. Johnswort leaves, flowers, and caulis.	<i>Hypericum perforatum</i> L	Hypericin-free alcohol distillate form only; in alcoholic beverages only.
Sandalwood, white (yellow, or East Indian).	<i>Santalum album</i> L.	
Sandarac	<i>Tetraclinis articulata</i> (Vahl.), Mast	In alcoholic beverages only.
Sarsaparilla	<i>Smilax aristolochiaefolia</i> Mill., (Mexican sarsaparilla), <i>S. regelii</i> Killip et Morton (Honduras sarsaparilla), <i>S. febrifuga</i> Kunth (Ecuadorean sarsaparilla), or undetermined <i>Smilax</i> spp. (Ecuadorean or Central American sarsaparilla).	
Sassafras leaves	<i>Sassafras albidum</i> (Nutt.) Nees	Safrole free.
Senna, Alexandria	<i>Cassia acutifolia</i> Delile.	
Serpentaria (Virginia snakeroot)	<i>Aristolochia serpentaria</i> L	In alcoholic beverages only.
Simaruba bark	<i>Simaruba amara</i> Aubl	Do.
Snakeroot, Canadian (wild ginger)	<i>Asarum canadense</i> L.	
Spruce needles and twigs	<i>Picea glauca</i> (Moench) Voss or <i>P. mariana</i> (Mill.) BSP.	
Storax (styrax)	<i>Liquidambar orientalis</i> Mill. or <i>L. styraciflua</i> L.	
Tagetes (marigold)	<i>Tagetes patula</i> L., <i>T. erecta</i> L., or <i>T. minuta</i> L. ( <i>T. glandulifera</i> Schrank).	As oil only.
Tansy	<i>Tanacetum vulgare</i> L	In alcoholic beverages only; finished alcoholic beverage thujone free. <sup>1</sup>
Thistle, blessed (holy thistle)	<i>Onicis benedictus</i> L	In alcoholic beverages only.
<i>Thymus capitatus</i> (Spanish "organum").	<i>Thymus capitatus</i> Hoffmg. et Link..	
Tolu	<i>Myroxylon balsamum</i> (L.) Harms.	
Turpentine	<i>Pinus palustris</i> Mill. and other <i>Pinus</i> spp. which yield terpene oils exclusively.	
Valerian rhizome and roots	<i>Valeriana officinalis</i> L.	
Veronica	<i>Veronica officinalis</i> L	Do.
Vervain, European	<i>Verbena officinalis</i> L	Do.
Vetiver	<i>Vetiveria zizanioides</i> Stapf	Do.
Violet, Swiss	<i>Viola calcarata</i> L.	
Walnut husks (hulls), leaves, and green nuts.	<i>Juglans nigra</i> L. or <i>J. regia</i> L.	
Woodruff, sweet	<i>Asperula odorata</i> L	In alcoholic beverages only.
Yarrow	<i>Achillea millefolium</i> L	In beverages only; finished beverage thujone free. <sup>1</sup>
Yerba santa	<i>Eriodictyon californicum</i> (Hook, et Arn.) Torr..	
Yucca, Joshua-tree	<i>Yucca brevifolia</i> Engelm.	
Yucca, Mohave	<i>Yucca schidigera</i> Roezl ex Ortgies ( <i>Y. mohavensis</i> Sarg.).	

<sup>1</sup> As determined by using the method (or, in other than alcoholic beverages, a suitable adaptation thereof) in section 9.129 of the "Official Methods of Analysis of the Association of Official Analytical Chemists," 13th Ed. (1980), which is incorporated by reference. Copies may be obtained from the Association of Official Analytical Chemists International, 481 North Frederic Ave., suite 500, Gaithersburg, MD 20877-2504, or may be examined at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC 20408

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**§ 172.515 Synthetic flavoring substances and adjuvants.**

Synthetic flavoring substances and adjuvants may be safely used in food in accordance with the following conditions.

(a) They are used in the minimum quantity required to produce their intended effect, and otherwise in accordance with all the principles of good manufacturing practice.

(b) They consist of one or more of the following, used alone or in combination

with flavoring substances and adjuvants generally recognized as safe in food, prior-sanctioned for such use, or regulated by an appropriate section in this part.

Acetal; acetaldehyde diethyl acetal.  
 Acetaldehyde phenethyl propyl acetal.  
 Acetanilole; 4'-methoxyacetophenone.  
 Acetophenone; methyl phenyl ketone.  
 Allyl anthranilate.  
 Allyl butyrate.  
 Allyl cinnamate.  
 Allyl cyclohexaneacetate.  
 Allyl cyclohexanebutyrate.  
 Allyl cyclohexanehexanoate.  
 Allyl cyclohexanepropionate.  
 Allyl cyclohexanevalerate.  
 Allyl disulfide.  
 Allyl 2-ethylbutyrate.  
 Allyl hexanoate; allyl caproate.  
 Allyl  $\alpha$ -ionone; 1-(2,6,6-trimethyl-2-cyclohexene-1-yl)-1,6-heptadiene-3-one.  
 Allyl isothiocyanate; mustard oil.  
 Allyl isovalerate.  
 Allyl mercaptan; 2-propene-1-thiol.  
 Allyl nonanoate.  
 Allyl octanoate.  
 Allyl phenoxyacetate.  
 Allyl phenylacetate.  
 Allyl propionate.  
 Allyl sorbate; allyl 2,4-hexadienoate.  
 Allyl sulfide.  
 Allyl tiglate; allyl *trans*-2-methyl-2-butenate.  
 Allyl 10-undecenoate.  
 Ammonium isovalerate.  
 Ammonium sulfide.  
 Amyl alcohol; pentyl alcohol.  
 Amyl butyrate.  
 $\alpha$ -Amylcinnamaldehyde.  
 $\alpha$ -Amylcinnamaldehyde dimethyl acetal.  
 $\alpha$ -Amylcinnamyl acetate.  
 $\alpha$ -Amylcinnamyl alcohol.  
 $\alpha$ -Amylcinnamyl formate.  
 $\alpha$ -Amylcinnamyl isovalerate.  
 Amyl formate.  
 Amyl heptanoate.  
 Amyl hexanoate.  
 Amyl octanoate.  
 Anisole; methoxybenzene.  
 Anisyl acetate.  
 Anisyl alcohol; *p*-methoxybenzyl alcohol.  
 Anisyl butyrate.  
 Anisyl formate.  
 Anisyl phenylacetate.  
 Anisyl propionate.  
 Beechwood creosote.  
 Benzaldehyde dimethyl acetal.  
 Benzaldehyde glyceryl acetal; 2-phenyl-*m*-dioxan-5-ol.  
 Benzaldehyde propylene glycol acetal; 4-methyl-2-phenyl-*m*-dioxolane.  
 Benzenethiol; thiophenol.  
 Benzoin; 2-hydroxy-2-phenylacetophenone.  
 Benzophenone; diphenylketone.  
 Benzyl acetate.

Benzyl acetoacetate.  
 Benzyl alcohol.  
 Benzyl benzoate.  
 Benzyl butyl ether.  
 Benzyl butyrate.  
 Benzyl cinnamate.  
 Benzyl 2,3-dimethylcrotonate; benzyl methyl tiglate.  
 Benzyl disulfide; dibenzyl disulfide.  
 Benzyl ethyl ether.  
 Benzyl formate.  
 3-Benzyl-4-heptanone; benzyl dipropyl ketone.  
 Benzyl isobutyrate.  
 Benzyl isovalerate.  
 Benzyl mercaptan;  $\alpha$ -toluenethiol.  
 Benzyl methoxyethyl acetal; acetaldehyde benzyl  $\beta$ -methoxyethyl acetal.  
 Benzyl phenylacetate.  
 Benzyl propionate.  
 Benzyl salicylate.  
 Birch tar oil.  
 Borneol; *d*-camphanol.  
 Bornyl acetate.  
 Bornyl formate.  
 Bornyl isovalerate.  
 Bornyl valerate.  
 $\beta$ -Bourbonene; 1,2,3,3a,3b $\beta$ ,4,5,6,6a $\beta$ ,6b $\alpha$ -decahydro- $\alpha$ -isopropyl-3a $\alpha$ -methyl-6-methyl-ene-cyclobuta [1,2:3,4] dicyclopentene.  
 2-Butanol.  
 2-Butanone; methyl ethyl ketone.  
 Butter acids.  
 Butter esters.  
 Butyl acetate.  
 Butyl acetoacetate.  
 Butyl alcohol; 1-butanol.  
 Butyl anthranilate.  
 Butyl butyrate.  
 Butyl butyryllactate; lactic acid, butyl ester, butyrate.  
 $\alpha$ -Butylcinnamaldehyde.  
 Butyl cinnamate.  
 Butyl 2-decenoate.  
 Butyl ethyl malonate.  
 Butyl formate.  
 Butyl heptanoate.  
 Butyl hexanoate.  
 Butyl *p*-hydroxybenzoate.  
 Butyl isobutyrate.  
 Butyl isovalerate.  
 Butyl lactate.  
 Butyl laurate.  
 Butyl levulinate.  
 Butyl phenylacetate.  
 Butyl propionate.  
 Butyl stearate.  
 Butyl sulfide.  
 Butyl 10-undecenoate.  
 Butyl valerate.  
 Butyraldehyde.  
 Cadinene.  
 Camphene; 2,2-dimethyl-3-methylenenorbornane.  
 $d$ -Camphor.  
 Carvacrol; *p*-cymenol.  
 Carvacryl ethyl ether; 2-ethoxy-*p*-cymene.

Carveol; *p*-mentha-6,8-dien-2-ol.  
 4-Carvomenthenol; 1-*p*-menthen-4-ol; 4-terpinenol.  
*cis* Carvone oxide; 1,6-epoxy-*p*-menth-8-en-2-one.  
 Carvyl acetate.  
 Carvyl propionate.  
 β-Caryophyllene.  
 Caryophyllene alcohol.  
 Caryophyllene alcohol acetate.  
 β-Caryophyllene oxide; 4-12,12-trimethyl-9-methylene-5-oxatricyclo [8.2.0.0<sup>4,6</sup>] dodecane.  
 Cedarwood oil alcohols.  
 Cedarwood oil terpenes.  
 1,4-Cineole.  
 Cinnamaldehyde ethylene glycol acetal.  
 Cinnamic acid.  
 Cinnamyl acetate.  
 Cinnamyl alcohol; 3-phenyl-2-propen-1-ol.  
 Cinnamyl benzoate.  
 Cinnamyl butyrate.  
 Cinnamyl cinnamate.  
 Cinnamyl formate.  
 Cinnamyl isobutyrate.  
 Cinnamyl isovalerate.  
 Cinnamyl phenylacetate.  
 Cinnamyl propionate.  
 Citral diethyl acetal; 3,7-dimethyl-2,6-octadienal diethyl acetal.  
 Citral dimethyl acetal; 3,7-dimethyl-2,6-octadienal dimethyl acetal.  
 Citral propylene glycol acetal.  
 Citronellal; 3,7-dimethyl-6-octenal; rhodinal.  
 Citronellol; 3,7-dimethyl-6-octen-1-ol; *d*-citronellol.  
 Citronelloxyacetaldehyde.  
 Citronellyl acetate.  
 Citronellyl butyrate.  
 Citronellyl formate.  
 Citronellyl isobutyrate.  
 Citronellyl phenylacetate.  
 Citronellyl propionate.  
 Citronellyl valerate.  
*p*-Cresol.  
 Cuminaldehyde; cuminal; *p*-isopropyl benzaldehyde.  
 Cyclohexaneacetic acid.  
 Cyclohexaneethyl acetate.  
 Cyclohexyl acetate.  
 Cyclohexyl anthranilate.  
 Cyclohexyl butyrate.  
 Cyclohexyl cinnamate.  
 Cyclohexyl formate.  
 Cyclohexyl isovalerate.  
 Cyclohexyl propionate.  
*p*-Cymene.  
 γ-Decalactone; 4-hydroxy-decanoic acid, γ-lactone.  
 γ-Decalactone; 5-hydroxy-decanoic acid, δ-lactone.  
 Decanal dimethyl acetal.  
 1-Decanol; decylic alcohol.  
 2-Decenal.  
 3-Decen-2-one; heptylidene acetone.  
 Decyl acetate.  
 Decyl butyrate.  
 Decyl propionate.  
 Dibenzyl ether.  
 4,4-Dibutyl-γ-butyrolactone; 4,4-dibutyl-4-hydroxy-butyric acid, γ-lactone.  
 Dibutyl sebacate.  
 Diethyl malate.  
 Diethyl malonate; ethyl malonate.  
 Diethyl sebacate.  
 Diethyl succinate.  
 Diethyl tartrate.  
 2,5-Diethyltetrahydrofuran.  
 Dihydrocarveol; 8-*p*-menthen-2-ol; 6-methyl-3-isopropenylcyclohexanol.  
 Dihydrocarvone.  
 Dihydrocarvyl acetate.  
*m*-Dimethoxybenzene.  
*p*-Dimethoxybenzene; dimethyl hydroquinone.  
 2,4-Dimethylacetophenone.  
 α,α-Dimethylbenzyl isobutyrate; phenyldimethylcarbinyl isobutyrate.  
 2,6-Dimethyl-5-heptenal.  
 2,6-Dimethyl octanal; isodecylaldehyde.  
 3,7-Dimethyl-1-octanol; tetrahydrogeraniol.  
 α,α-Dimethylphenethyl acetate; benzylpropyl acetate;  
 benzyl dimethylcarbinyl acetate.  
 α,α-Dimethylphenethyl alcohol; dimethylbenzyl carbinol.  
 α,α-Dimethylphenethyl butyrate; benzyl dimethylcarbinyl butyrate.  
 α,α-Dimethylphenethyl formate; benzyl dimethylcarbinyl formate.  
 Dimethyl succinate.  
 1,3-Diphenyl-2-propanone; dibenzyl ketone.  
 delta-Dodecalactone; 5-hydroxydodecanoic acid, daltalactone.  
 γ-Dodecalactone; 4-hydroxydodecanoic acid γ-lactone.  
 2-Dodecenal.  
 Estragole.  
 ρ-Ethoxybenzaldehyde.  
 Ethyl acetoacetate.  
 Ethyl 2-acetyl-3-phenylpropionate; ethylbenzyl acetoacetate.  
 Ethyl aconitate, mixed esters.  
 Ethyl acrylate.  
 Ethyl *p*-anisate.  
 Ethyl anthranilate.  
 Ethyl benzoate.  
 Ethyl benzoylacetate.  
 α-Ethylbenzyl butyrate; α-phenylpropyl butyrate.  
 Ethyl brassylate; tridecanedioic acid cyclic ethylene glycol diester; cyclo 1,13-ethylenedioxytridecan-1,13-dione.  
 2-Ethylbutyl acetate.  
 2-Ethylbutyraldehyde.  
 2-Ethylbutyric acid.  
 Ethyl cinnamate.  
 Ethyl crotonate; *trans*-2-butenic acid ethylester.  
 Ethyl cyclohexanepropionate.  
 Ethyl decanoate.  
 2-Ethylfuran.  
 Ethyl 2-furanpropionate.  
 4-Ethylguaicol; 4-ethyl-2-methoxyphenol.

Ethyl heptanoate.	$\gamma$ -Heptalactone; 4-hydroxyheptanoic acid, $\gamma$ -lactone.
2-Ethyl-2-heptenal; 2-ethyl-3-butylacrolein.	Heptanal; enanthaldehyde.
Ethyl hexanoate.	Heptanal dimethyl acetal.
Ethyl isobutyrate.	Heptanal 1,2-glyceryl acetal.
Ethyl isovalerate.	2,3-Heptanedione; acetyl valeryl.
Ethyl lactate.	3-Heptanol.
Ethyl laurate.	2-Heptanone; methyl amyl ketone.
Ethyl levulinate.	3-Heptanone; ethyl butyl ketone.
Ethyl maltol; 2-ethyl-3-hydroxy-4H-pyran-4-one.	4-Heptanone; dipropyl ketone.
Ethyl 2-methylbutyrate.	<i>cis</i> -4-Heptenal; <i>cis</i> -4-hepten-1-al.
Ethyl myristate.	Heptyl acetate.
Ethyl nitrite.	Heptyl alcohol; enanthic alcohol.
Ethyl nonanoate.	Heptyl butyrate.
Ethyl 2-nonynoate; ethyl octyne carbonate.	Heptyl cinnamate.
Ethyl octanoate.	Heptyl formate.
Ethyl oleate.	Heptyl isobutyrate.
Ethyl phenylacetate.	Heptyl octanoate.
Ethyl 4-phenylbutyrate.	1-Hexadecanol; cetyl alcohol.
Ethyl 3-phenylglycidate.	$\omega$ -6-Hexadecenlactone; 16-hydroxy-6-
Ethyl 3-phenylpropionate; ethyl hydrocinnamate.	hexadecenoic acid, $\omega$ -lactone; ambrettolide.
Ethyl propionate.	$\gamma$ -Hexalactone; 4-hydroxyhexanoic acid, $\gamma$ -lactone; tonkalide.
Ethyl pyruvate.	Hexanal; caproic aldehyde.
Ethyl salicylate.	2,3-Hexanedione; acetyl butyryl.
Ethyl sorbate; ethyl 2,4-hexadienoate.	Hexanoic acid; caproic acid.
Ethyl tiglate; ethyl <i>trans</i> -2-methyl-2-butenate.	2-Hexenal.
Ethyl undecanoate.	2-Hexen-1-ol.
Ethyl 10-undecenoate.	3-Hexen-1-ol; leaf alcohol.
Ethyl valerate.	2-Hexen-1-yl acetate.
Eucalyptol; 1,8-epoxy- <i>p</i> -menthane; cineole.	3-Hexenyl isovalerate.
Eugenyl acetate.	3-Hexenyl 2-methylbutyrate.
Eugenyl benzoate.	3-Hexenyl phenylacetate; <i>cis</i> -3-hexenyl phenylacetate.
Eugenyl formate.	Hexyl acetate.
Eugenyl methyl ether; 4-allylveratrole; methyl eugenol.	2-Hexyl-4-acetoxytetrahydrofuran.
Farnesol; 3,7,11-trimethyl-2,6,10-dodecatrien-1-ol.	Hexyl alcohol.
<i>d</i> -Fenchone; <i>d</i> -1,3,3-trimethyl-2-norbornanone.	Hexyl butyrate.
Fenchyl alcohol; 1,3,3-trimethyl-2-norbornanol.	$\alpha$ -Hexylcinnamaldehyde.
Formic acid	Hexyl formate.
(2-Furyl)-2-propanone; furyl acetone.	Hexyl hexanoate.
1-Furyl-2-propanone; furyl acetone.	2-Hexylidene cyclopentanone.
Fusel oil, refined (mixed amyl alcohols).	Hexyl isovalerate.
Geranyl acetoacetate; <i>trans</i> -3,7-dimethyl-2,6-octadien-1-yl acetoacetate.	Hexyl 2-methylbutyrate.
Geranyl acetone; 6,10-dimethyl-5,9-undecadien-2-one.	Hexyl octanoate.
Geranyl benzoate.	Hexyl phenylacetate; <i>n</i> -hexyl phenylacetate.
Geranyl butyrate.	Hexyl propionate.
Geranyl formate.	Hydroxycitronellal; 3,7-dimethyl-7-hydroxy-octanal.
Geranyl hexanoate	Hydroxycitronellal diethyl acetal.
Geranyl isobutyrate.	Hydroxycitronellal dimethyl acetal.
Geranyl isovalerate.	Hydroxycitronellal; 3,7-dimethyl-1,7-octanediol.
Geranyl phenylacetate.	<i>N</i> -(4-Hydroxy-3-methoxybenzyl)-nonanamide; pelargonyl vanillylamide.
Geranyl propionate.	5-Hydroxy-4-octanone; butyrolin.
Glucose pentaacetate.	4-( <i>p</i> -Hydroxyphenyl)-2-butanone; <i>p</i> -hydroxybenzyl acetone.
Guaiacol; $\mu$ -methoxyphenol.	Indole.
Guaiacyl acetate; $\mu$ -methoxyphenyl acetate.	$\alpha$ -Ionone; 4-(2,6,6-trimethyl-2-cyclohexen-1-yl)-3-buten-2-one.
Guaiacyl phenylacetate.	$\beta$ -Ionone; 4-(2,6,6-trimethyl-1-cyclohexen-1-yl)-3-buten-2-one.
Guaiene; 1,4-dimethyl-7-isopropenyl- $\Delta$ 9,10-octahydroazulene.	$\alpha$ -Irone; 4-(2,5,6,6-tetramethyl-2-cyclohexen-1-yl)-3-buten-2-one; 6-methylionone.
Guaiol acetate; 1,4-dimethyl-7-( $\alpha$ -hydroxyisopropyl)- $\delta$ 9,10-octahydroazulene acetate.	Isoamyl acetate.

Isoamyl acetoacetate.  
 Isoamyl alcohol; isopentyl alcohol; 3-methyl-1-butanol.  
 Isoamyl benzoate.  
 Isoamyl butyrate.  
 Isoamyl cinnamate.  
 Isoamyl formate.  
 Isoamyl 2-furanbutyrate;  $\alpha$ -isoamyl furfurylpropionate.  
 Isoamyl 2-furanpropionate;  $\alpha$ -isoamyl furfurylacetate.  
 Isoamyl hexanoate.  
 Isoamyl isobutyrate.  
 Isoamyl isovalerate.  
 Isoamyl laurate.  
 Isoamyl-2-methylbutyrate; isopentyl-2-methylbutyrate.  
 Isoamyl nonanoate.  
 Isoamyl octanoate.  
 Isoamyl phenylacetate.  
 Isoamyl propionate.  
 Isoamyl pyruvate.  
 Isoamyl salicylate.  
 Isoborneol.  
 Isobornyl acetate.  
 Isobornyl formate.  
 Isobornyl isovalerate.  
 Isobornyl propionate.  
 Isobutyl acetate.  
 Isobutyl acetoacetate.  
 Isobutyl alcohol.  
 Isobutyl angelate; isobutyl *cis*-2-methyl-2-butenate.  
 Isobutyl anthranilate.  
 Isobutyl benzoate.  
 Isobutyl butyrate.  
 Isobutyl cinnamate.  
 Isobutyl formate.  
 Isobutyl 2-furanpropionate.  
 Isobutyl heptanoate.  
 Isobutyl hexanoate.  
 Isobutyl isobutyrate.  
 $\alpha$ -Isobutylphenethyl alcohol; isobutyl benzyl carbinol; 4-methyl-1-phenyl-2-pentanol.  
 Isobutyl phenylacetate.  
 Isobutyl propionate.  
 Isobutyl salicylate.  
 2-Isobutylthiazole.  
 Isobutyraldehyde.  
 Isobutyric acid.  
 Isoeugenol; 2-methoxy-4-propenylphenol.  
 Isoeugenyl acetate.  
 Isoeugenyl benzyl ether; benzyl isoeugenol.  
 Isoeugenyl ethyl ether; 2-ethoxy-5-propenylanisole; ethyl isoeugenol.  
 Isoeugenyl formate.  
 Isoeugenyl methyl ether; 4-propenylveratrole; methyl isoeugenol.  
 Isoeugenyl phenylacetate.  
 Isojasmonone; mixture of 2-hexylidenecyclopentanone and 2-hexyl-2-cyclopenten-1-one.  
 $\alpha$ -Isomethylionone; 4-(2,6,6-trimethyl-2-cyclohexen-1-yl)-3-methyl-3-buten-2-one; methyl  $\gamma$ -ionone.  
 Isopropyl acetate.  
 $\rho$ -Isopropylacetophenone.  
 Isopropyl alcohol; isopropanol.  
 Isopropyl benzoate.  
 $\rho$ -Isopropylbenzyl alcohol; cuminic alcohol;  $\rho$ -cymen-7-ol.  
 Isopropyl butyrate.  
 Isopropyl cinnamate.  
 Isopropyl formate.  
 Isopropyl hexanoate.  
 Isopropyl isobutyrate.  
 Isopropyl isovalerate.  
 $\rho$ -Isopropylphenylacetaldehyde;  $\rho$ -cymen-7-carboxaldehyde.  
 Isopropyl phenylacetate.  
 3-( $\rho$ -Isopropylphenyl)-propionaldehyde;  $\rho$ -isopropylhydrocinnamaldehyde; cuminyl acetaldehyde.  
 Isopropyl propionate.  
 Isopulegol; *p*-menth-8-en-3-ol.  
 Isopulegone; *p*-menth-8-en-3-one.  
 Isopulegyl acetate.  
 Isoquinoline.  
 Isovaleric acid.  
*cis*-Jasmone; 3-methyl-2-(2-pentenyl)-2-cyclopenten-1-one.  
 Lauric aldehyde; dodecanal.  
 Lauryl acetate.  
 Lauryl alcohol; 1-dodecanol.  
 Lepidine; 4-methylquinoline.  
 Levulinic acid.  
 Linalool oxide; *cis*- and *trans*-2-vinyl-2-methyl-5-(1'-hydroxy-1'-methylethyl) tetrahydrofuran.  
 Linalyl anthranilate; 3,7-dimethyl-1,6-octadien-3-yl anthranilate.  
 Linalyl benzoate.  
 Linalyl butyrate.  
 Linalyl cinnamate.  
 Linalyl formate.  
 Linalyl hexanoate.  
 Linalyl isobutyrate.  
 Linalyl isovalerate.  
 Linalyl octanoate.  
 Linalyl propionate.  
 Maltol; 3-hydroxy-2-methyl-4H-pyran-4-one.  
 Menthadienol; *p*-mentha-1,8(10)-dien-9-ol.  
*p*-Mentha-1,8-dien-7-ol; perillyl alcohol.  
 Menthadienyl acetate; *p*-mentha-1,8(10)-dien-9-yl acetate.  
*p*-Menth-3-en-1-ol.  
 1-*p*-Menthen-9-yl acetate; *p*-menth-1-en-9-yl acetate.  
 Menthol; 2-isopropyl-5-methylcyclohexanol.  
 Menthone; *p*-menthan-3-one.  
 Menthyl acetate; *p*-menth-3-yl acetate.  
 Menthyl isovalerate; *p*-menth-3-yl isovalerate.  
*o*-Methoxybenzaldehyde.  
*p*-Methoxybenzaldehyde; *p*-anisaldehyde.  
*o*-Methoxycinnamaldehyde.  
 2-Methoxy-4-methylphenol; 4-methylguaiaacol; 2-methoxy-*p*-cresol.  
 4-(*p*-Methoxyphenyl)-2-butanone; anisyl acetone.  
 1-(4-Methoxyphenyl)-4-methyl-1-penten-3-one; methoxystyryl isopropyl ketone.  
 1-(*p*-Methoxyphenyl)-1-penten-3-one;  $\alpha$ -methylanisylidene acetone; ethone.

- 1-(*p*-Methoxyphenyl)-2-propanone;  
anisylmethyl ketone; anisic ketone.
- 2-Methoxy-4-vinylphenol; *p*-vinylguaiacol.
- Methyl acetate.
- 4'-Methylacetophenone; *p*-  
methylacetophenone; methyl *p*-tolyl ke-  
tone.
- 2-Methylallyl butyrate; 2-methyl-2-propenyl-  
butyrate.
- Methyl anisate.
- o*-Methylanisole; *o*-cresyl methyl ether.
- p*-Methylanisole; *p*-cresyl methyl ether; *p*-  
methoxytoluene.
- Methyl benzoate.
- Methylbenzyl acetate, mixed *o*-,*m*-,*p*-.
- $\alpha$ -Methylbenzyl acetate; styralyl acetate.
- $\alpha$ -Methylbenzyl alcohol; styralyl alcohol.
- $\alpha$ -Methylbenzyl butyrate; styralyl butyrate.
- $\alpha$ -Methylbenzyl isobutyrate; styralyl  
isobutyrate.
- $\alpha$ -Methylbenzyl formate; styralyl formate.
- $\alpha$ -Methylbenzyl propionate; styralyl propio-  
nate.
- 2-Methyl-3-buten-2-ol.
- 2-Methylbutyl isovalerate.
- Methyl *p*-*tert*-butylphenylacetate.
- 2-Methylbutyraldehyde; methyl ethyl acetal-  
dehyde.
- 3-Methylbutyraldehyde; isovaleraldehyde.
- Methyl butyrate.
- 2-Methylbutyric acid.
- $\alpha$ -Methylcinnamaldehyde.
- p*-Methylcinnamaldehyde.
- Methyl cinnamate.
- 2-Methyl-1,3-cyclohexadiene.
- Methylcyclopentenolone; 3-methylcyclopen-  
tane-1,2-dione.
- Methyl disulfide; dimethyl disulfide.
- Methyl ester of rosin, partially hydrogenated  
(as defined in § 172.615); methyl  
dihydroabietate.
- Methyl heptanoate.
- 2-Methylheptanoic acid.
- 6-Methyl-3,5-heptadien-2-one.
- Methyl-5-hepten-2-ol.
- 6-Methyl-5-hepten-2-one.
- Methyl hexanoate.
- Methyl 2-hexanoate.
- Methyl *p*-hydroxybenzoate; methylparaben.
- Methyl  $\alpha$ -ionone; 5-(2,6,6-trimethyl-2-  
cyclohexen-1-yl)-4-penten-3-one.
- Methyl  $\beta$ -ionone; 5-(2,6,6-trimethyl-1-  
cyclohexen-1-yl)-4-penten-3-one.
- Methyl  $\Delta$ -ionone; 5-(2,6,6-trimethyl-3-  
cyclohexen-1-yl)-4-penten-3-one.
- Methyl isobutyrate.
- 2-Methyl-3-(*p*-isopropylphenyl)-propionalde-  
hyde;  $\alpha$ -methyl-*p*-isopropylhydro-  
cinnamaldehyde; cyclamen aldehyde.
- Methyl isovalerate.
- Methyl laurate.
- Methyl mercaptan; methanethiol.
- Methyl *o*-methoxybenzoate.
- Methyl *N*-methylanthranilate; dimethyl  
anthranilate.
- Methyl 2-methylbutyrate.
- Methyl-3-methylthiopropionate.
- Methyl 4-methylvalerate.
- Methyl myristate.
- Methyl  $\beta$ -naphthyl ketone; 2'-acetonaph-  
thone.
- Methyl nonanoate.
- Methyl 2-nonenoate.
- Methyl 2-nonynoate; methyloctyne carbon-  
ate.
- 2-Methyloctanal; methyl hexyl acetaldehyde.
- Methyl octanoate.
- Methyl 2-octynoate; methyl heptene carbon-  
ate.
- 4-Methyl-2,3-pentanedione; acetyl  
isobutyryl.
- 4-Methyl-2-pentanone; methyl isobutyl ke-  
tone.
- $\beta$ -Methylphenethyl alcohol; hydratropyl al-  
cohol.
- Methyl phenylacetate.
- 3-Methyl-4-phenyl-3-butene-2-one.
- 2-Methyl-4-phenyl-2-butyl acetate;  
dimethylphenylethyl carbonyl acetate.
- 2-Methyl-4-phenyl-2-butyl isobutyrate;  
dimethylphenyl ethylcarbonyl isobutyrate.
- 3-Methyl-2-phenylbutyraldehyde;  $\alpha$ -isopropyl  
phenylacetaldehyde.
- Methyl 4-phenylbutyrate.
- 4-Methyl-1-phenyl-2-pentanone; benzyl  
isobutyl ketone.
- Methyl 3-phenylpropionate; methyl  
hydrocinnamate.
- Methyl propionate.
- 3-Methyl-5-propyl-2-cyclohexen-1-one.
- Methyl sulfide.
- 3-Methylthiopropionaldehyde; methional.
- 2-Methyl-3-tolylpropionaldehyde, mixed *o*-,  
*m*-, *p*-.
- 2-Methylundecanal; methyl nonyl acetal-  
dehyde.
- Methyl 9-undecenoate.
- Methyl 2-undecynoate; methyl decyne car-  
bonate.
- Methyl valerate.
- 2-Methylvaleric acid.
- Myrcene; 7-methyl-3-methylene-1,6-  
octadiene.
- Myristaldehyde; tetradecanal.
- d*-Neomenthol; 2-isopropyl-5-  
methylcyclohexanol.
- Nerol; *cis*-3,7-dimethyl-2,6-octadien-1-ol.
- Nerolidol; 3,7,11-trimethyl-1,6,10-dodecatrien-  
3-ol.
- Neryl acetate.
- Neryl butyrate.
- Neryl formate.
- Neryl isobutyrate.
- Neryl isovalerate.
- Neryl propionate.
- 2,6-Nonadien-1-ol.
- $\gamma$ -Nonalactone; 4-hydroxynonanoic acid,  $\gamma$ -  
lactone; aldehyde C-18.
- Nonanal; pelargonic aldehyde.
- 1,3-Nonanediol acetate, mixed esters.
- Nonanoic acid; pelargonic acid.
- 2-Nonanone; methylheptyl ketone.
- 3-Nonanon-1-yl acetate; 1-hydroxy-3-  
nonanone acetate.



Nonyl acetate.  
 Nonyl alcohol; 1-nonanol.  
 Nonyl octanoate.  
 Nonyl isovalerate.  
 Nootkatone; 5,6-dimethyl-8-isopropenyl-bicyclo[4,4,0]-dec-1-en-3-one.  
 Ocimene; *trans*- $\beta$ -ocimene; 3,7-dimethyl-1,3,6-octatriene.  
 $\gamma$ -Octalactone; 4-hydroxyoctanoic acid,  $\gamma$ -lactone.  
 Octanal; caprylaldehyde.  
 Octanal dimethyl acetal.  
 1-Octanol; octyl alcohol.  
 2-Octanol.  
 3-Octanol.  
 2-Octanone; methyl hexyl ketone.  
 3-Octanone; ethyl amyl ketone.  
 3-Octanon-1-ol.  
 1-Octen-3-ol; amyl vinyl carbinol.  
 1-Octen-3-yl acetate.  
 Octyl acetate.  
 3-Octyl acetate.  
 Octyl butyrate.  
 Octyl formate.  
 Octyl heptanoate.  
 Octyl isobutyrate.  
 Octyl isovalerate.  
 Octyl octanoate.  
 Octyl phenylacetate.  
 Octyl propionate.  
 $\omega$ -Pentadecalactone; 15-hydroxypentadecanoic acid,  $\omega$ -lactone; pentadecanolate; angelica lactone.  
 2,3-Pentanedione; acetyl propionyl.  
 2-Pentanone; methyl propyl ketone.  
 4-Pentenoic acid.  
 1-Penten-3-ol.  
 Perillaldehyde; 4-isopropenyl-1-cyclohexene-1-carboxaldehyde; *p*-mentha-1,8-dien-7-al.  
 Perillyl acetate; *p*-mentha-1,8-dien-7-yl acetate.  
 $\alpha$ -Phellandrene; *p*-mentha-1,5-diene.  
 Phenethyl acetate.  
 Phenethyl alcohol;  $\beta$ -phenylethyl alcohol.  
 Phenethyl anthranilate.  
 Phenethyl benzoate.  
 Phenethyl butyrate.  
 Phenethyl cinnamate.  
 Phenethyl formate.  
 Phenethyl isobutyrate.  
 Phenethyl isovalerate.  
 Phenethyl 2-methylbutyrate.  
 Phenethyl phenylacetate.  
 Phenethyl propionate.  
 Phenethyl salicylate.  
 Phenethyl senecioate; phenethyl 3,3-dimethylacrylate.  
 Phenethyl tiglate.  
 Phenoxyacetic acid.  
 2-Phenoxyethyl isobutyrate.  
 Phenylacetaldehyde;  $\alpha$ -toluic aldehyde.  
 Phenylacetaldehyde 2,3-butylene glycol acetal.  
 Phenylacetaldehyde dimethyl acetal.  
 Phenylacetaldehyde glyceryl acetal.  
 Phenylacetic acid;  $\alpha$ -toluic acid.  
 4-Phenyl-2-butanol; phenylethyl methyl carbinol.  
 4-Phenyl-3-buten-2-ol; methyl styryl carbinol.  
 4-Phenyl-3-buten-2-one.  
 4-Phenyl-2-butyl acetate; phenylethyl methyl carbinyl acetate.  
 1-Phenyl-3-methyl-3-pentanol; phenylethyl methyl ethyl carbinol.  
 1-Phenyl-1-propanol; phenylethyl carbinol.  
 3-Phenyl-1-propanol; hydrocinnamyl alcohol.  
 2-Phenylpropionaldehyde; hydratropaldehyde.  
 3-Phenylpropionaldehyde; hydrocinnamaldehyde.  
 2-Phenylpropionaldehyde dimethyl acetal; hydratropic aldehyde dimethyl acetal.  
 3-Phenylpropionic acid; hydrocinnamic acid.  
 3-Phenylpropyl acetate.  
 2-Phenylpropyl butyrate.  
 3-Phenylpropyl cinnamate.  
 3-Phenylpropyl formate.  
 3-Phenylpropyl hexanoate.  
 2-Phenylpropyl isobutyrate.  
 3-Phenylpropyl isobutyrate.  
 3-Phenylpropyl isovalerate.  
 3-Phenylpropyl propionate.  
 2-(3-Phenylpropyl)-tetrahydrofuran.  
 $\alpha$ -Pinene; 2-pinene.  
 $\beta$ -Pinene; 2(10)-pinene.  
 Pine tar oil.  
 Pinocarveol; 2(10)-pinen-3-ol.  
 Piperidine.  
 Piperine.  
*d*-Piperitone; *p*-menth-1-en-3-one.  
 Piperitenone; *p*-mentha-1,4(8)-dien-3-one.  
 Piperitenone oxide; 1,2-epoxy-*p*-menth-4-(8)-en-3-one.  
 Piperonyl acetate; heliotropyl acetate.  
 Piperonyl isobutyrate.  
 Polylimonene.  
 Polysorbate 20; polyoxyethylene (20) sorbitan monolaurate.  
 Polysorbate 60; polyoxyethylene (20) sorbitan monostereate.  
 Polysorbate 80; polyoxyethylene (20) sorbitan monooleate.  
 Potassium acetate.  
 Propenylguaethol; 6-ethoxy-*m*-anol.  
 Propionaldehyde.  
 Propyl acetate.  
 Propyl alcohol; 1-propanol.  
*p*-Propyl anisole; dihydroanethole.  
 Propyl benzoate.  
 Propyl butyrate.  
 Propyl cinnamate.  
 Propyl disulfide.  
 Propyl formate.  
 Propyl 2-furanacrylate.  
 Propyl heptanoate.  
 Propyl hexanoate.  
 Propyl *p*-hydroxybenzoate; propylparaben.  
 3-Propylideneephthalide.  
 Propyl isobutyrate.  
 Propyl isovalerate.  
 Propyl mercaptan.  
 $\alpha$ -Propylphenethyl alcohol.

Propyl phenylacetate.  
 Propyl propionate.  
 Pulegone; *p*-menth-4(8)-en-3-one.  
 Pyridine.  
 Pyroligneous acid extract.  
 Pyruvaldehyde.  
 Pyruvic acid.  
 Rhodinol; 3,7-dimethyl-7-octen-1-ol; *l*-citronellol.  
 Rhodinyol acetate.  
 Rhodinyol butyrate.  
 Rhodinyol formate.  
 Rhodinyol isobutyrate.  
 Rhodinyol isovalerate.  
 Rhodinyol phenylacetate.  
 Rhodinyol propionate.  
 Rum ether; ethyl oxyhydrate.  
 Salicylaldehyde.  
 Santalol,  $\alpha$  and  $\beta$ .  
 Santalyol acetate.  
 Santalyol phenylacetate.  
 Skatole.  
 Sorbitan monostearate.  
 Styrene.  
 Sucrose octaacetate.  
 $\alpha$ -Terpinene.  
 $\gamma$ -Terpinene.  
 $\alpha$ -Terpineol; *p*-menth-1-en-8-ol.  
 $\beta$ -Terpineol.  
 Terpinolene; *p*-menth-1,4(8)-diene.  
 Terpinyl acetate.  
 Terpinyl anthranilate.  
 Terpinyl butyrate.  
 Terpinyl cinnamate.  
 Terpinyl formate.  
 Terpinyl isobutyrate.  
 Terpinyl isovalerate.  
 Terpinyl propionate.  
 Tetrahydrofurfuryl acetate.  
 Tetrahydrofurfuryl alcohol.  
 Tetrahydrofurfuryl butyrate.  
 Tetrahydrofurfuryl propionate.  
 Tetrahydro-pseudo-ionone; 6,10-dimethyl-9-undecen-2-one.  
 Tetrahydrolinalool; 3,7-dimethyloctan-3-ol.  
 Tetramethyl ethylcyclohexenone; mixture of 5-ethyl-2,3,4,5-tetramethyl-2-cyclohexen-1-one and 5-ethyl-3,4,5,6-tetramethyl-2-cyclohexen-1-one.  
 2-Thienyl mercaptan; 2-thienylthiol.  
 Thymol.  
 Tolualdehyde glyceryl acetal, mixed *o*, *m*, *p*.  
 Tolualdehydes, mixed *o*, *m*, *p*.  
*p*-Tolylacetaldehyde.  
*o*-Tolyl acetate; *o*-cresyl acetate.  
*p*-Tolyl acetate; *p*-cresyl acetate.  
 4-(*p*-Tolyl)-2-butanone; *p*-methylbenzylacetone.  
*p*-Tolyl isobutyrate.  
*p*-Tolyl laurate.  
*p*-Tolyl phenylacetate.  
 2-(*p*-Tolyl)-propionaldehyde; *p*-methylhydropropionaldehyde.  
 Tributyl acetylcitrate.  
 2-Tridecenal.  
 2,3-Undecadione; acetyl nonyryl.

$\gamma$ -Undecalactone; 4-hydroxyundecanoic acid  $\gamma$ -lactone; peach aldehyde; aldehyde C-14.  
 Undecenal.  
 2-Undecanone; methyl nonyl ketone.  
 9-Undecenal; undecenoic aldehyde.  
 10-Undecenol.  
 Undecen-1-ol; undecylenic alcohol.  
 10-Undecen-1-yl acetate.  
 Undecyl alcohol.  
 Valeraldehyde; pentanal.  
 Valeric acid; pentanoic acid.  
 Vanillin acetate; acetyl vanillin.  
 Veratraldehyde.  
 Verbenol; 2-pinen-4-ol.  
 Zingerone; 4-(4-hydroxy-3-methoxyphenyl)-2-butanone.

(c)  $\Delta$ -Decalactone and  $\Delta$ -dodecalactone when used separately or in combination in oleomargarine are used at levels not to exceed 10 parts per million and 20 parts per million, respectively, in accordance with § 166.110 of this chapter.

(d) BHA (butylated hydroxyanisole) may be used as an antioxidant in flavoring substances whereby the additive does not exceed 0.5 percent of the essential (volatile) oil content of the flavoring substance.

[42 FR 14491, Mar. 15, 1977, as amended at 42 FR 23148, May 6, 1977; 43 FR 19843, May 9, 1978; 45 FR 22915, Apr. 4, 1980; 47 FR 27810, June 25, 1982; 48 FR 10812, Mar. 15, 1983; 48 FR 51907, Nov. 15, 1983; 49 FR 5747, Feb. 15, 1984; 50 FR 42932, Oct. 23, 1985; 54 FR 7402, Feb. 21, 1989; 61 FR 14245, Apr. 1, 1996]

**§ 172.520 Cocoa with dioctyl sodium sulfosuccinate for manufacturing.**

The food additive “cocoa with dioctyl sodium sulfosuccinate for manufacturing,” conforming to § 163.117 of this chapter and § 172.810, is used or intended for use as a flavoring substance in dry beverage mixes whereby the amount of dioctyl sodium sulfosuccinate does not exceed 75 parts per million of the finished beverage. The labeling of the dry beverage mix shall bear adequate directions to assure use in compliance with this section.

**§ 172.530 Disodium guanylate.**

Disodium guanylate may be safely used as a flavor enhancer in foods, at a level not in excess of that reasonably required to produce the intended effect.

**§ 172.535 Disodium inosinate.**

The food additive disodium inosinate may be safely used in food in accordance with the following prescribed conditions:

(a) The food additive is the disodium salt of inosinic acid, manufactured and purified so as to contain no more than 150 parts per million of soluble barium in the compound disodium inosinate with seven and one-half molecules of water of crystallization.

(b) The food additive is used as a flavoring adjuvant in food.

**§ 172.540 DL-Alanine.**

DL-Alanine (a racemic mixture of D- and L-alanine; CAS Reg. No. 302-72-7) may be safely used as a flavor enhancer for sweeteners in pickling mixtures at a level not to exceed 1 percent of the pickling spice that is added to the pickling brine.

[56 FR 6968, Feb. 21, 1991]

**§ 172.560 Modified hop extract.**

The food additive modified hop extract may be safely used in beer in accordance with the following prescribed conditions:

(a) The food additive is used or intended for use as a flavoring agent in the brewing of beer.

(b) The food additive is manufactured by one of the following processes:

(1) The additive is manufactured from a hexane extract of hops by simultaneous isomerization and selective reduction in an alkaline aqueous medium with sodium borohydride, whereby the additive meets the following specifications:

(i) A solution of the food additive solids is made up in approximately 0.012 *n* alkaline methyl alcohol (6 milliliters of 1 *n* sodium hydroxide diluted to 500 milliliters with methyl alcohol) to show an absorbance at 253 millimicrons of 0.6 to 0.9 per centimeter. (This absorbance is obtained by approximately 0.03 milligram solids per milliliter.) The ultraviolet absorption spectrum of this solution exhibits the following characteristics: An absorption peak at 253 millimicrons; no absorption peak at 325 to 330 millimicrons; the absorbance at 268

millimicrons does not exceed the absorbance at 272 millimicrons.

(ii) The boron content of the food additive does not exceed 310 parts per million (0.0310 percent), calculated as boron.

(2) The additive is manufactured from hops by a sequence of extractions and fractionations, using benzene, light petroleum spirits, and methyl alcohol as solvents, followed by isomerization by potassium carbonate treatment. Residues of solvents in the modified hop extract shall not exceed 1.0 part per million of benzene, 1.0 part per million of light petroleum spirits, and 250 parts per million of methyl alcohol. The light petroleum spirits and benzene solvents shall comply with the specifications in §172.250 except that the boiling point range for light petroleum spirits is 150°F-300°F.

(3) The additive is manufactured from hops by a sequence of extractions and fractionations, using methylene chloride, hexane, and methyl alcohol as solvents, followed by isomerization by sodium hydroxide treatment. Residues of the solvents in the modified hop extract shall not exceed 5 parts per million of methylene chloride, 25 parts per million of hexane, and 100 parts per million of methyl alcohol.

(4) The additive is manufactured from hops by a sequence of extractions and fractionations, using benzene, light petroleum spirits, methyl alcohol, *n*-butyl alcohol, and ethyl acetate as solvents, followed by isomerization by potassium carbonate treatment. Residues of solvents in the modified hop extract shall not exceed 1.0 part per million of benzene, 1.0 part per million of light petroleum spirits, 50 parts per million of methyl alcohol, 50 parts per million of *n*-butyl alcohol, and 1 part per million of ethyl acetate. The light petroleum spirits and benzene solvents shall comply with the specifications in §172.250 except that the boiling point range for light petroleum spirits is 150° F to 300° F.

(5) The additive is manufactured from hops by an initial extraction and fractionation using one or more of the following solvents: Ethylene dichloride, hexane, isopropyl alcohol, methyl alcohol, methylene chloride, trichloroethylene, and water; followed

§ 172.575

by isomerization by calcium chloride or magnesium chloride treatment in ethylene dichloride, methylene chloride, or trichloroethylene and a further sequence of extractions and fractionations using one or more of the solvents set forth in this paragraph. Residues of the solvents in the modified hop extract shall not exceed 125 parts per million of hexane; 150 parts per million of ethylene dichloride, methylene chloride, or trichloroethylene; or 250 parts per million of isopropyl alcohol or methyl alcohol.

(6) The additive is manufactured from hops by an initial extraction and fractionation using one or more of the solvents listed in paragraph (b)(5) of this section followed by: Hydrogenation using palladium as a catalyst in methyl alcohol, ethyl alcohol, or isopropyl alcohol acidified with hydrochloric or sulfuric acid; oxidation with peracetic acid; isomerization by calcium chloride or magnesium chloride treatment in ethylene dichloride, methylene chloride, or trichloroethylene (alternatively, the hydrogenation and isomerization steps may be performed in reverse order); and a further sequence of extractions and fractionations using one or more of the solvents listed in paragraph (b)(5) of this section. The additive shall meet the residue limitations as prescribed in paragraph (b)(5) of this section.

(7) The additive is manufactured from hops as set forth in paragraph (b)(6) of this section followed by reduction with sodium borohydride in aqueous alkaline methyl alcohol, and a sequence of extractions and fractionations using one or more of the solvents listed in paragraph (b)(5) of this section. The additive shall meet the residue limitations as prescribed in paragraph (b)(5) of this section, and a boron content level not in excess of 300 parts per million (0.0300 percent), calculated as boron.

(8) The additive is manufactured from hops as a nonisomerizable non-volatile hop resin by an initial extraction and fractionation using one or more of the solvents listed in paragraph (b)(5) of this section followed by a sequence of aqueous extractions and removal of nonaqueous solvents to less

21 CFR Ch. I (4–1–96 Edition)

than 0.5 percent. The additive is added to the wort before or during cooking in the manufacture of beer.

§ 172.575 Quinine.

Quinine, as the hydrochloride salt or sulfate salt, may be safely used in food in accordance with the following conditions:

Uses	Limitations
In carbonated beverages as a flavor.	Not to exceed 83 parts per million, as quinine. Label shall bear a prominent declaration of the presence of quinine either by the use of the word "quinine" in the name of the article or through a separate declaration.

§ 172.580 Safrole-free extract of sassafras.

The food additive safrole-free extract of sassafras may be safely used in accordance with the following prescribed conditions:

(a) The additive is the aqueous extract obtained from the root bark of the plant *Sassafras albidum* (Nuttall) Nees (Fam. Lauraceae).

(b) It is obtained by extracting the bark with dilute alcohol, first concentrating the alcoholic solution by vacuum distillation, then diluting the concentrate with water and discarding the oily fraction.

(c) The purified aqueous extract is safrole-free.

(d) It is used as a flavoring in food.

§ 172.585 Sugar beet extract flavor base.

Sugar beet extract flavor base may be safely used in food in accordance with the provisions of this section.

(a) Sugar beet extract flavor base is the concentrated residue of soluble sugar beet extractives from which sugar and glutamic acid have been recovered, and which has been subjected to ion exchange to minimize the concentration of naturally occurring trace minerals.

(b) It is used as a flavor in food.

§ 172.590 Yeast-malt sprout extract.

Yeast-malt sprout extract, as described in this section, may be safely used in food in accordance with the following prescribed conditions:

(a) The additive is produced by partial hydrolysis of yeast extract (derived from *Saccharomyces cerevisiae*, *Saccharomyces fragilis*, or *Candida utilis*) using the sprout portion of malt barley as the source of enzymes. The additive contains a maximum of 6 percent 5' nucleotides by weight.

(b) The additive may be used as a flavor enhancer in food at a level not in excess of that reasonably required to produce the intended effect.

**Subpart G—Gums, Chewing Gum Bases and Related Substances**

**§ 172.610 Arabinogalactan.**

Arabinogalactan may be safely used in food in accordance with the following conditions:

(a) Arabinogalactan is a polysaccharide extracted by water from Western larch wood, having galactose

units and arabinose units in the approximate ratio of six to one.

(b) It is used in the following foods in the minimum quantity required to produce its intended effect as an emulsifier, stabilizer, binder, or bodying agent: Essential oils, nonnutritive sweeteners, flavor bases, nonstandardized dressings, and pudding mixes.

**§ 172.615 Chewing gum base.**

The food additive chewing gum base may be safely used in the manufacture of chewing gum in accordance with the following prescribed conditions:

(a) The food additive consists of one or more of the following substances that meet the specifications and limitations prescribed in this paragraph, used in amounts not to exceed those required to produce the intended physical or other technical effect.

**MASTICATORY SUBSTANCES**

NATURAL (COAGULATED OR CONCENTRATED LATICES) OF VEGETABLE ORIGIN

Family	Genus and species
<b>Sapotaceae:</b>	
Chicle .....	Manilkara zapotilla Gilly and Manilkara chicle Gilly.
Chiquibul .....	Manilkara zapotilla Gilly.
Crown gum .....	Manilkara zapotilla Gilly and Manilkara chicle Gilly.
Gutta hang kang .....	Palaquium leiocarpum Boerl. and Palaquium oblongifolium Burck.
Massaranduba balata (and the solvent-free resin extract of Massaranduba balata).	Manilkara huberi (Ducke) Chevalier.
Massaranduba chocolate .....	Manilkara solimoesensis Gilly.
Nispero .....	Manilkara zapotilla Gilly and Manilkara chicle Gilly.
Rosidinha (rosadinha) .....	Micropholis (also known as Sideroxylon) spp.
Venezuelan chicle .....	Manilkara williamsii Standley and related spp.
<b>Apocynaceae:</b>	
Jelutong .....	Dyera costulata Hook, F. and Dyera lowii Hook, F.
Leche caspi (sorva) .....	Couma macrocarpa Barb. Rodr.
Pendare .....	Couma macrocarpa Barb. Rodr. and Couma utilis (Mart.) Muell. Arg.
Perillo .....	Couma macrocarpa Barb. Rodr. and Couma utilis (Mart.) Muell. Arg.
<b>Moraceae:</b>	
Leche de vaca .....	Brosimum utile (H.B.K.) Pittier and Poulsenia spp.; also Lacmellea standleyi (Woodson), Monachino (Apocynaceae).
Niger gutta .....	Ficus platyphylla Del.
Tunu (tuno) .....	Castilla fallax Cook.
<b>Euphorbiaceae:</b>	
Chilte .....	Cnidoscolus (also known as Jatropa) elasticus Lundell and Cnidoscolus tepiquensis (Cost. and Gall.) McVaugh.
Natural rubber (smoked sheet and latex solids).	Hevea brasiliensis.
<b>Synthetic</b>	
<b>Specifications</b>	
Butadiene-styrene rubber .....	Basic polymer.
Isobutylene-isoprene copolymer (butyl rubber).	Do.