

§ 172.510

21 CFR Ch. I (4-1-09 Edition)

needed to produce its intended effect but not in excess of 13 parts per million 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, concentrates, 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 ¹
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. dioica</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 ¹
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.

Food and Drug Administration, HHS

§ 172.510

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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.
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 free ¹
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.	

Common name	Scientific name	Limitations
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. canadensis</i> Ait., or <i>P. nigra</i> L.	Do.
Quassia	<i>Picrasma excelsa</i> (Sw.) Planch, or <i>Quassia amara</i> L.	
Quebracho bark	<i>Aspidosperma quebracho-blanco</i> Schlecht, or (<i>Quebrachia lorentzii</i> (Griseb)).	<i>Schinopsis lorentzii</i> (Griseb.) Engl.
Quillaia (soapbark)	<i>Quillaia saponaria</i> Mol.	
Red saunders (red sandalwood)	<i>Pterocarpus san alinus</i> L	In alcoholic beverages only
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 (Ecuadorian sarsaparilla), or undetermined <i>Smilax</i> spp. (Ecuadorian 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 ¹
Thistle, blessed (holy thistle)	<i>Oniscus benedictus</i> L	In alcoholic beverages only
<i>Thymus capitatus</i> (Spanish "origanum")	<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 ¹
Yerba santa	<i>Eriodictyon californicum</i> (Hook, et Arn.) Torr.	
Yucca, Joshua-tree	<i>Yucca brevifolia</i> Engelm.	
Yucca, Mohave	<i>Yucca schidigera</i> Roetzl ex Ortgies (<i>Y. mohavensis</i> Sarg.).	

¹ 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 AOAC INTERNATIONAL, 481 North Frederick Ave., suite 500, Gaithersburg, MD 20877, or may be examined at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

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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.
 Acetanisole; 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 α -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.
 α -Amylcinnamaldehyde.
 α -Amylcinnamaldehyde dimethyl acetal.
 α -Amylcinnamyl acetate.
 α -Amylcinnamyl alcohol.
 α -Amylcinnamyl formate.
 α -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; α -toluenethiol.
 Benzyl methoxyethyl acetal; acetaldehyde benzyl β -methoxyethyl acetal.
 Benzyl phenylacetate.
 Benzyl propionate.
 Benzyl salicylate.
 Birch tar oil.
 Borneol; *d*-camphanol.
 Bornyl acetate.
 Bornyl formate.
 Bornyl isovalerate.
 Bornyl valerate.
 β -Bourbonene; 1,2,3,3a,3b β ,4,5,6,6a β ,6b α -decahydro-1 α -isopropyl-3a α -methyl-6-methylene-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.
 α -Butylcinnamaldehyde.
 Butyl cinnamate.