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BY S. M. COHEN, G. EISENBRAND, S. FUKUSHIMA,
N. J. GOODERHAM, F. P. GUENGERICH, S. S. HECHT,
I. M. C. M. RIETJENS, C. HARMAN, AND S. V. TAYLOR

20 GRAS 28 FLAVORING SUBSTANCES

The 28th publication by the Expert Panel of the Flavor and Extract Manufacturers Association provides an update on recent progress in the consideration of flavoring ingredients generally recognized as safe under the Food Additives Amendment.

The Flavor and Extract Manufacturers Association (FEMA) Expert Panel began a program in 1960 to assess the safety of flavor ingredients for their intended use in human food. The FEMA GRAS program continues through today as the longest-running and most widely recognized GRAS assessment program (Hallagan and Hall 1995, 2009).

The 1958 Food Additives Amendment to the Federal Food, Drug and Cosmetic Act defines a food additive as: "... any substance ... which ... may ... [become] a component or ... [affect] the characteristics of any food ... if such substance is not generally recognized, among experts qualified by scientific training and experience to evaluate its safety, as having been adequately shown through scientific procedures ... to be safe under the conditions of its intended use." This amendment established a requirement for premarket approval and criteria for GRAS "generally recognized as safe" status, the rigor of which is no less than that established for a food additive. By excluding GRAS substances from the definition of "food additive," Congress provided the Food and Drug Administration (FDA) flexibility and discretion in allocating resources to food additive issues of potentially greater safety

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FEMA GRAS Publications (3–27)

Hall, R. L. and B. L. Oser. 1965. 3. GRAS Substances. *Food Technol.* 19(2): Supp., 151.

Hall, R. L. and B. L. Oser. 1970. 4. GRAS Substances. *Food Technol.* 24(5): 25.

Oser, B. L. and R. L. Hall. 1972. 5. GRAS Substances. *Food Technol.* 26(11): 35.

Oser, B. L. and R. A. Ford. 1973. 6. GRAS Substances. *Food Technol.* 27(1): 64.

Oser, B. L. and R. A. Ford. 1973. 7. GRAS Substances. *Food Technol.* 27(11): 56.

Oser, B. L. and R. A. Ford. 1974. 8. GRAS Substances. *Food Technol.* 28(9): 74.

Oser, B. L. and R. A. Ford. 1975. 9. GRAS Substances. *Food Technol.* 29(8): 70.

Oser, B. L. and R. A. Ford. 1977. 10. GRAS Substances. *Food Technol.* 31(1): 65.

Oser, B. L. and R. A. Ford. 1978. 11. GRAS Substances. *Food Technol.* 32(2): 60.

Oser, B. L. and R. A. Ford. 1979. 12. GRAS Substances. *Food Technol.* 33(7): 65.

Oser, B. L., R. A. Ford, and B. K. Bernard. 1984. 13. GRAS Substances. *Food Technol.* 38(10): 68.

Oser, B. L., C. S. Weil, L. A. Woods, and B. K. Bernard. 1985. 14. GRAS Substances. *Food Technol.* 39(11): 108.

Burdock, G. A., B. M. Wagner, R. L. Smith, I. C. Munro, and P. M. Newberne. 1990. 15. GRAS Substances. *Food Technol.* 44(2): 78.

Smith, R. L. and R. A. Ford. 1993. GRAS Flavoring Substances 16. *Food Technol.* 47(6): 104.

Smith, R. L., P. M. Newberne, T. B. Adams, R. A. Ford, and J. B. Hallagan. 1996. GRAS Flavoring Substances 17. *Food Technol.* 50(10): 72.

Newberne, P. M., R. L. Smith, J. Doull, J. I. Goodman, I. C. Munro, P. S. Portoghese, B. M. Wagner, C. S. Weil, L. A. Woods, T. B. Adams, J. B. Hallagan, and R. A. Ford. 1998. GRAS Flavoring Substances 18. *Food Technol.* 52(9): 21.

Newberne, P. M., R. L. Smith, J. Doull, V. J.

Feron, J. I. Goodman, I. C. Munro, P. S. Portoghese, W. J. Waddell, B. M. Wagner, C. S. Weil, T. B. Adams, and J. B. Hallagan. 2000. GRAS Flavoring Substances 19. *Food Technol.* 54(6): 66.

Smith, R. L., J. Doull, V. J. Feron, J. I. Goodman, I. C. Munro, P. M. Newberne, P. S. Portoghese, W. J. Waddell, B. M. Wagner, T. B. Adams, and M. M. McGowen. 2001. GRAS Flavoring Substances 20. *Food Technol.* 55(12): 1.

Smith, R. L., S. M. Cohen, J. Doull, V. J. Feron, J. I. Goodman, L. J. Marnett, P. S. Portoghese, W. J. Waddell, B. M. Wagner, and T. B. Adams. 2003. GRAS Flavoring Substances 21. *Food Technol.* 57(5): 46.

Smith, R. L., S. M. Cohen, J. Doull, V. J. Feron, J. I. Goodman, L. J. Marnett, P. S. Portoghese, W. J. Waddell, B. M. Wagner, and T. B. Adams. 2005. GRAS Flavoring Substances 22. *Food Technol.* 59(8): 24.

Waddell, W. J., S. M. Cohen, V. J. Feron, J. I. Goodman, L. J. Marnett, P. S. Portoghese, I. M. C. M. Rietjens, R. L. Smith, T. B. Adams, C. L. Gavin, M. M. McGowen, and M. C. Williams. 2007. GRAS Flavoring Substances 23. *Food Technol.* 61(8): 22.

Smith, R. L., W. J. Waddell, S. M. Cohen, V. J. Feron, L. J. Marnett, P. S. Portoghese, I. M. C. M. Rietjens, T. B. Adams, C. L. Gavin, M. M. McGowen, S. V. Taylor, and M. C. Williams. 2009. GRAS Flavoring Substances 24. *Food Technol.* 63(6): 46.

Smith, R. L., W. J. Waddell, S. M. Cohen, S. Fukushima, N. J. Gooderham, S. S. Hecht, L. J. Marnett, P. S. Portoghese, I. M. C. M. Rietjens, T. B. Adams, C. L. Gavin, M. M. McGowen, S. V. Taylor. 2011. GRAS Flavoring Substances 25. *Food Technol.* 65(7): 44.

Marnett, L. J., S. M. Cohen, S. Fukushima, N. J. Gooderham, S. S. Hecht, I. M. C. M. Rietjens, R. L. Smith, T. B. Adams, J. B. Hallagan, C. Harman, M. M. McGowen, and S. V. Taylor. 2013. GRAS Flavoring Substances 26. *Food Technol.* 67(8): 38.

Cohen, S. M., S. Fukushima, N. J. Gooderham, S. S. Hecht, L. J. Marnett, I. M. C. M. Rietjens, R. L. Smith, M. Bastaki, M. M. McGowen, C. Harman, and S. V. Taylor. 2015. GRAS Flavoring Substances 27. *Food Technol.* 69(8): 40.

concern. The FEMA GRAS program operates within the confines of the 1958 Food Additives Amendment.

This GRAS 28 publication includes the results of the Expert Panel's review of 60 new FEMA GRAS flavorings (Tables 1 and 2). In addition, the Expert Panel determined that new use levels and/or use in new food categories for 18 flavorings are consistent with their current FEMA GRAS status (Table 3) and concluded that the FEMA GRAS status of one flavoring should be changed. The Panel also describes its progress evaluating natural flavor complexes for reaffirmation of GRAS status, and an update on the examination of sensory information on flavorings with modifying properties.

Progress in the Reevaluation of Natural Flavor Complexes

In 2005, the FEMA Expert Panel published an approach to the safety evaluation of natural flavor complexes, or naturally occurring mixtures derived from plants or other natural sources used for the flavoring of food (Smith et al. 2004; Smith et al. 2005a,b). The Panel's approach included a rigorous assessment of the chemical and biological properties, including consideration of a complete chemical characterization of the natural flavor complex (NFC). The basis of the approach is grouping of the constituents into different congeneric groups exhibiting similar biological and toxicological properties, and a comparison of intake of each congeneric group to the threshold of toxicological concern (TTC) (Munro et al. 1996). Recently, the Panel updated the procedure from 2005 as described in Cohen et al. 2018. The update broadens the scope of the 2005 procedure to include complex mixtures obtained from nonbotanical sources, and refinements to the

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consideration of the unknown portion of a complex material and the genotoxicity evaluation, in addition to other minor changes.

As part of the reevaluation of citrus-derived natural flavor complexes, current practices of manufacture were reported, and it was revealed that orange essence

oils are recovered through evaporation as part of the juicing process and that distillation is currently not used. The Panel has updated the description of FEMA 2821 to Orange Essence Oil (*Citrus sinensis* (L.) Osbeck). Additionally, FEMA 2822 is now described as Orange Oil Terpeneless (*Citrus sinensis* (L.)

Osbeck). These changes are further discussed in the forthcoming publication on the FEMA GRAS assessment of natural flavor complexes: Citrus-derived flavoring ingredients.

Update on the Use of Sensory Data Within the Context of a FEMA GRAS Evaluation

Within the scope of the FEMA GRAS program, the FEMA Expert Panel reviews flavoring substances that impart or modify flavor and flavor adjuvants (“nonflavor ingredients”) that facilitate the function of compounded flavors in foods (Hallagan et al. 2018; Hallagan and Hall 2009). Included within the definition of flavoring substances are “flavorings with modifying properties” (FMPs), which may not have or impart a specific characteristic flavor of their own but can modify the flavor profile by altering the flavor attributes of the flavoring

Expert Panel Member Changes

In January 2017, Dr. Gerhard Eisenbrand of University of Kaiserslautern, Germany, joined the FEMA Expert Panel.

In May of 2017, Dr. Robert Smith, Professor Emeritus in the Dept. of Molecular Toxicology, Imperial College School of Medicine, United Kingdom, stepped down from his role as a member of the FEMA Expert Panel. As a long-serving member of the Expert Panel, Dr. Smith’s expertise in biochemistry and metabolism contributed significantly to the work of the Expert Panel.



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and the food to which it is added. To facilitate the review of FMPs, the Panel requires the submission of sensory testing to demonstrate that the technical effect and functionality in food is limited to flavoring under conditions of its intended use (Marnett et al. 2013). In 2013, the FEMA Science Committee Sensory Data Task Force, composed of sensory testing experts, published “Sensory Testing for Flavorings with Modifying Properties,” which outlined a set of tests designed to demonstrate if the technical function in food of the ingredient under conditions of intended use is that of a flavor (Harman et al. 2013). Since that publication, the Expert Panel has reviewed numerous flavoring substances with properties of flavor modification using the guidance outlined in Harman et al. 2013. Additionally, in Hallagan et al.

2018, an interpretation of the labeling implications for flavoring ingredients, including FMPs, is available to assist the flavor industry in understanding U.S. flavor labeling regulations and their applicability to these types of flavoring substances.

Change in GRAS Status of Methyl Eugenol

The FEMA GRAS status of methyl eugenol (CAS NO. 93-15-2; FEMA No. 2475) under its conditions of intended use as a flavor ingredient was reviewed by the FEMA Expert Panel. After reviewing the available information relevant to the FEMA GRAS status of methyl eugenol, including recent studies, the Expert Panel concluded that additional data are required to support the continuation of its GRAS status. Such data should clarify the relevance to humans of DNA adducts formed by

methyl eugenol. Until such data are available for review by the Expert Panel, the flavor ingredient methyl eugenol has been removed from the FEMA GRAS list. The Expert Panel also considered the FEMA GRAS status of herbs, spices, and essential oils that contain naturally occurring methyl eugenol, including basil, pimento, allspice, etc., and their extractives. The Panel concluded that these flavorings continue to meet the criteria for FEMA GRAS under their conditions of intended use as flavorings. **FT**

Samuel M. Cohen, MD, PhD, is Havlik-Wall Professor of Oncology in the Dept. of Pathology and Microbiology, University of Nebraska Medical Center. **Gerhard Eisenbrand, PhD**, is retired from the University of Kaiserslautern, Dept. of Chemistry, Food Chemistry and Toxicology, Germany. **Shoji Fukushima, MD, PhD**, is Research Advisor of the Japan Bioassay Research Center, Japan. **Nigel J. Gooderham, PhD**, is Professor of Molecular Toxicology and the Assistant Provost in the Dept. of Surgery and Cancer, Imperial College London. **F.P. Guengerich** is Professor of Biochemistry and Director of Guengerich Research Laboratory, Vanderbilt University. **Stephen S. Hecht, PhD**, is the Wallin Land Grant Professor of Cancer Prevention, Masonic Cancer Center and Dept. of Laboratory Medicine and Pathology, University of Minnesota. **Ivonne M. C. M. Rietjens, PhD**, is Full Professor in Toxicology at the Division of Toxicology, Wageningen University, Wageningen, The Netherlands. **Christie L. Harman**, is with the Flavor and Extract Manufacturers Association, Washington, D.C. **Sean V. Taylor, PhD**, is the Scientific Secretary to the FEMA Expert Panel, Washington, D.C.

Basis for Safety Evaluation Decisions for GRAS 28

Synopses of the FEMA Expert Panel GRAS determinations for each new substance listed in Table 1 are available on femaflavor.org.



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REFERENCES

- Cohen, S. M., G. Eisenbrand, S. Fukushima, N. J. Gooderham, F. P. Guengerich, S. S. Hecht, I. M. C. M. Rietjens, J. M. Davidsen, C. L. Harman, and S. V. Taylor. 2018. "Updated procedure for the safety evaluation of natural flavor complexes used as food ingredients." *Food Chem. Toxicol.* 113: 171.
- Hallagan, J. B. and R. L. Hall. 1995. "FEMA GRAS—A GRAS assessment program for flavor ingredients." *Regul. Toxicol. Pharmacol.* 21: 422.
- Hallagan, J. B. and R. L. Hall. 2009. "Under conditions of intended use—New developments in the FEMA GRAS program and the safety assessment of flavor ingredients." *Food Chem. Toxicol.* 47: 267.
- Harman, C. L. and J. B. Hallagan. 2013. "Sensory testing for flavorings with modifying properties." *Food Technol.* 67(11): 44.
- Munro, I. C., R. A. Ford, E. Kennepohl, and J. G. Sprenger. 1996. "Correlation of structural class with no-observed-effect levels; a proposal for establishing a threshold of concern." *Food Chem. Toxicol.* 34: 829.
- Smith, R. L., T. B. Adams, S. M. Cohen, J. Doull, V. J. Feron, J. L. Goodman, R. L. Hall, L. J. Marnett, P. S. Portoghese, W. J. Waddell, and B. M. Wagner. 2004. "Safety evaluation of natural flavor complexes." *Toxicol. Lett.* 149: 197.
- Smith, R. L., S. M. Cohen, J. Doull, V. J. Feron, J. I. Goodman, L. J. Marnett, P. S. Portoghese, W. J. Waddell, B. M. Wagner, R. L. Hall, N. A. Higley, C. Lucas-Gavin, and T. B. Adams. 2005a. "A procedure for the safety evaluation of natural flavor complexes used as ingredients in food: essential oils." *Food Chem. Toxicol.* 43: 345.
- Smith, R. L., S. M. Cohen, J. Doull, V. J. Feron, J. I. Goodman, L. J. Marnett, I. C. Munro, P. S. Portoghese, W. J. Waddell, B. M. Wagner, and T. B. Adams. 2005b. "Criteria for the safety evaluation of flavoring substances—The Expert Panel of the Flavor and Extract Manufacturers Association." *Food Chem. Toxicol.* 43: 1141.

In Memoriam

The Expert Panel notes with sadness the passing of two former FEMA Expert Panel members, Dr. Victor J. Feron on February 10, 2018, and Dr. John Doull on March 24, 2017.

Before retirement, Dr. Feron was a Professor at the Institute for Risk Assessment Sciences, Utrecht University. He served as President and Past President of the Netherlands Society of Toxicology, and Chairman and Past Chairman of the Dutch Expert Committee on Occupational Standards. Dr. Feron retired from the FEMA Expert Panel in 2006 after seven years as a Panel member.

Dr. John Doull was Professor Emeritus of the University of Kansas Medical School and coauthor of *Casarett and Doull's Toxicology*. He was the 26th president of the Society of Toxicology, and served as a scientific consultant to many organizations, including the Environmental Protection Agency, the National Institutes of Health, and a White House Advisory Panel. Dr. Doull retired from the FEMA Expert Panel in 2003 after serving for 25 years as a Panel member.

TABLE 1 - Primary Names & Synonyms

Primary names (in boldface) & synonyms (in lightface)

FEMA NO.	SUBSTANCE PRIMARY NAME AND SYNONYMS	FEMA NO.	SUBSTANCE PRIMARY NAMES AND SYNONYMS
4817	5-[(Methylthio)methyl]thioacetate 3,5-Dithiahexan-2-one Methylthiomethyl acetyl sulfide	4833	(2S)-3',7-Dihydroxy-8-methyl-4'-methoxyflavan (S)-2-(3-Hydroxy-4-methoxyphenyl)-8-methylchroman-7-ol (2S)-7,3'-Dihydroxy-4'-methoxy-8-methylflavane
4818	trans-1-Ethyl-2-methylpropyl 2-butenolate 1-Ethyl-2-methylpropyl (2E)-2-butenic acid ester	4834	(R)-5-hydroxy-4-(4'-hydroxy-3'-methoxyphenyl)-7-methylchroman-2-one (4R)-4-(4-Hydroxy-3-methoxyphenyl)-5,7-dimethyl-3,4-dihydro-2H-1-benzopyran-2-one
4819	Erythritol (2R,3S)-rel-1,2,3,4-Butanetetrol (2R,3S)-Butane-1,2,3,4-tetrol <i>meso</i> -Erythritol Mesoerythritol	4835	2,4-Dihydroxy-N-[(4-hydroxy-3-methoxyphenyl)methyl]benzamide 2,4-Dihydroxybenzoic acid vanillylamide
4820	Purified Damar Gum Purified <i>Shorea javanica</i> Gum	4836	10% solution of 3,4-dimethyl-2,3-dihydrothiophene-2-thiol
4821	gamma-Aminobutyric acid:Linoleic acid conjugates GABA:Linoleic acid conjugates	4837	Chrysanthemum parthenium extract Feverfew extract Common pellitory extract Motherwort extract <i>Tanacetum parthenium</i> extract
4822	2,6-Dipropyl-5,6-dihydro-2H-thiopyran-3-carboxaldehyde 3,6-Dihydro-2,6-dipropyl-2H-thiopyran-5-carboxaldehyde	4838	Valencene 80 extract
4823	Allyl 1-propenyl disulfide Allyl propenyl disulfide 1-Propenyl 2-propenyl disulfide	4839	Mixture of 3- and 4-butyl-2-thiophenecarboxaldehyde
4824	2-(5-Isopropyl-2-methyl-tetrahydrothiophen-2-yl)-ethyl acetate Tetrahydro-2-methyl-5-(1-methylethyl)-2-thiopheneethanol acetate	4840	(±)-Tetrahydronootkatone (±)-Octahydro-4,4a-dimethyl-6-(1-methylethyl)-2(1H)-naphthalenone (±)-6-Isopropyl-4,4a-dimethyl-decalin-2-one
4825	E-6-Nonenal <i>trans</i> -6-Nonenal	4841	cis-5-Dodecenyl acetate (Z)-5-Dodecen-1-ol acetate <i>cis</i> -Dodec-5-en-1-yl acetate
4826	3-Phenylpropyl 2-(4-hydroxy-3-methoxyphenyl)acetate 3-Phenylpropyl homovanillate	4842	2,4,5-Trithiaoctane 1-(Methylthiomethyl)-2-propyl disulfane
4827	1-(4-Methyl-3-cyclohexen-1-yl)-ethanone 1-Methyl-4-acetyl-1-cyclohexene 1-(4-Methylcyclohex-3-enyl)ethanone 4-Methyl-3-cyclohexen-1-yl methyl ketone	4843	3-(Allyldithio)butan-2-one 3-(Allyldisulfanyl)butan-2-one 3-(2-Propen-1-yl dithio)-2-butanone
4828	1,1-Propanedithioacetate S,S'-propane-1,1-diyl diethanethioate Propane-1,1-dithioacetate Ethanethioic acid S,S'-propylidene ester 1,1-Propanedithiol, diacetate	4844	(2E,4E)-2,4-Decadien-1-ol acetate <i>trans, trans</i> -2,4-decadien-1-yl acetate
4829	2-Pyrrolidone <i>alpha</i> -Pyrrolidone <i>gamma</i> -Aminobutyrolactam Butyrolactam	4845	Glucosylated stevia extract
4830	7,8-Dihydroxyflavone 7,8-Dihydroxy-2-phenyl-4H-1-benzopyran-4-one 7,8-Dihydroxy-2-phenyl-4-benzopyrone 7,8-Dihydroxy-2-phenyl-4H-chromen-4-one	4846	Grapefruit essence oil (Citrus paradisi Macf.) <i>Citrus paradisi</i> Macf. essence oil
4831	Katemfe fruit extract <i>Thaumatococcus daniellii</i> fruit extract	4847	Grapefruit oil, terpeneless (Citrus paradisi Macf.) <i>Citrus paradisi</i> Macf. Oil, terpeneless
4832	2-(3-Benzoyloxypropyl)pyridine 2-[3-(Phenylmethoxy)propyl]-pyridine	4848	Lemon terpenes <i>Citrus limon</i> (L.) Burm. f., terpenes
		4849	Lime terpenes <i>Citrus aurantifolia</i> Swingle, terpenes <i>Citrus medica</i> var. <i>acida</i> , terpenes <i>Citrus latifolia</i> , terpenes

FEMA NO.	SUBSTANCE PRIMARY NAME AND SYNONYMS
4850	Orange terpenes <i>Citrus sinensis</i> (L.) Osbeck., terpenes
4851	Grapefruit terpenes <i>Citrus paradisi</i> Macf., terpenes
4852	Lemon essence oil (<i>Citrus limon</i> (L.) Burm. f.) <i>Citrus limon</i> (L.) Burm. f. essence oil
4853	Petitgrain oil terpeneless <i>Citrus aurantium</i> L. oil terpeneless
4854	Tangelo oil (<i>Citrus paradisi</i> Macf. x <i>Citrus tangerine</i> hort. ex Tanaka) <i>Citrus paradisi</i> Macf. x <i>Citrus tangerine</i> hort. ex Tanaka oil <i>Citrus x tangelo</i> oil
4855	Clementine oil (<i>Citrus clementina</i> hort. ex Tanaka) <i>Citrus clementina</i> hort. ex Tanaka oil
4856	Blood orange oil (<i>Citrus sinensis</i> (L.) Osbeck 'Blood orange') <i>Citrus sinensis</i> (L.) Osbeck 'Blood orange' oil
4857	Iyokan oil (<i>Citrus iyo</i>) <i>Citrus iyo</i> oil
4858	Hassaku oil (<i>Citrus hassaku</i> hort. ex Tanaka) <i>Citrus hassaku</i> hort. ex Tanaka oil
4859	Sikuwasya oil (<i>Citrus depressa</i>) <i>Citrus depressa</i> oil Shiikuwasha oil
4860	Natsumikan oil (<i>Citrus natsudaikai</i>) <i>Citrus natsudaikai</i> oil
4861	Mikan oil (<i>Citrus unshiu</i>) <i>Citrus unshiu</i> oil Satsuma mandarin oil
4862	Yuzu oil (<i>Citrus junos</i> (Sieb.) c. Tanaka) <i>Citrus junos</i> Siebold ex Tanaka oil
4863	Sudachi oil (<i>Citrus sudachi</i> hort. ex Shirai) <i>Citrus sudachi</i> hort. ex Shirai oil
4864	Kabosu oil (<i>Citrus sphaerocarpa</i>) <i>Citrus sphaerocarpa</i> oil
4865	Ponkan oil (<i>Citrus reticulata</i> Blanco 'Ponkan') <i>Citrus reticulata</i> Blanco 'Ponkan' oil
4866	Orange essence water phase (<i>Citrus sinensis</i> (L.) Osbeck) Orange aroma water phase
4867	(3S,5R,8S)-3,8-Dimethyl-5-prop-1-en-2-yl-3,4,5,6,7,8-hexahydro-2H-azulen-1-one (-)-Guaia-1(5),11-dien-2-one

FEMA NO.	SUBSTANCE PRIMARY NAMES AND SYNONYMS
4868	4-(4-Methyl-3-penten-1-yl)-2(5H)-furanone
4869	4-(1-Menthoxy)-2-butanone 4-[(1R,2S,5R)-2-Isopropyl-5-methylcyclohexyl]-oxybutan-2-one
4870	2-Ethyl-4-methyl-1,3-dithiolane
4871	2-Phenoxyethyl 2-(4-hydroxy-3-methoxyphenyl)acetate
4872	3-(3-Hydroxy-4-methoxyphenyl)-1-(2,4,6-trihydroxyphenyl)propan-1-one Hesperetin dihydrochalcone
4873	Watermint, <i>Mentha aquatica</i> L., extract Marsh mint extract Hairy mint extract Smartweed extract Pepperwort extract Wild mint extract
4876	Enzyme modified stevia, stevioside 20%
4877	(E)-3-(3,4-Dimethoxyphenyl)-N-[2-(4-methoxyphenyl)-ethyl]-acrylamide 4-methoxyphenylethylamine 3,4-dimethoxycinnamic amide
4878	<i>Cordyceps sinensis</i> fermentation product

TABLE 2 - Average Usual Use Levels/Average Maximum Use Levels

Average Usual Use Levels (ppm)/Average Maximum Use Levels (ppm) for new FEMA GRAS Flavoring Substances on which the FEMA Expert Panel based its judgements that the substances are generally recognized as safe (GRAS)

	5-[(Methylthio)methyl]thio-acetate	trans-1-Ethyl-2-methyl-propyl 2-butenate	Erythritol	Purified Damar Gum	gamma-Aminobutyric acid:linoleic acid conjugates	2,6-Dipropyl-5,6-dihydro-2H-thiopyran-3-carboxaldehyde	Allyl 1-propenyl disulfide	2-(5-Isopropyl-2methyl-tetrahydrothiophen-2-yl)-ethyl acetate	F-6-Nonenal	3-Phenylpropyl 2-(4-hydroxy-3-methoxyphenyl)acetate
CATEGORY	4817	4818	4819	4820	4821	4822	4823	4824	4825	4826
BAKED GOODS	0.5/1	0.4/4			0.02/0.5		1/4	0.3/1	0.001/0.01	
BEVERAGES, NONALCOHOLIC		0.2/2	5,000/12,500	100/200	0.01/0.25	0.05/5	0.1/0.5	0.1/0.5	0.00001/0.0001	3/15
BEVERAGES, ALCOHOLIC		0.2/2		100/200	0.0002/0.005	0.03/10		0.3/2	0.00001/0.0001	3/15
BREAKFAST CEREALS		0.4/4			0.02/0.5		1/4	0.3/1	0.001/0.01	
CHEESES	0.5/1	0.1/0.5			0.02/0.5		1/4		0.001/0.01	
CHEWING GUM		0.5/5			0.02/0.5	10/100		1/5	0.0001/0.001	25/100
CONDIMENTS AND RELISHES					0.01/0.25		1/4			5/40
CONFECTIONS AND FROSTINGS		0.4/4			0.01/0.25	0.3/30		0.5/2	0.0001/0.001	
EGG PRODUCTS					0.01/0.25				0.0001/0.001	
FATS AND OILS	0.5/1				0.02/0.5		1/4	0.3/1	0.01/0.1	
FISH PRODUCTS					0.01/0.25		1/4		0.0001/0.001	
FROZEN DAIRY		0.5/5			0.01/0.5	0.5/50		0.1/0.5	0.0001/0.001	
FRUIT ICES		0.2/2	5,000/12,500		0.01/0.25	0.05/5		0.1/0.5	0.0001/0.001	
GELATINS AND PUDDINGS		0.2/2			0.01/0.25	0.2/10		0.1/0.5	0.0001/0.001	
GRANULATED SUGAR										
GRAVIES	0.3/1				0.01/0.25		1/4		0.001/0.01	
HARD CANDY		0.4/4			0.02/0.5	0.5/50		0.5/2	0.001/0.01	5/20
IMITATION DAIRY					0.02/0.5	0.05/5			0.001/0.01	
INSTANT COFFEE AND TEA		0.1/1	5,000/12,500		0.0002/0.005	0.05/5	0.01/0.1	0.2/1	0.00001/0.0001	2/15
JAMS AND JELLIES		1/5			0.01/0.25	0.5/20		0.3/1		
MEAT PRODUCTS	0.5/1				0.02/0.5		1/4		0.0001/0.001	5/40
MILK PRODUCTS		0.2/2			0.01/0.25	0.05/5	1/4	0.1/0.5	0.00001/0.0001	2/10
NUT PRODUCTS					0.002/0.05		1/4		0.0001/0.001	
OTHER GRAINS					0.002/0.05		1/4		0.0001/0.001	
POULTRY	0.5/1				0.02/0.5		1/4			
PROCESSED FRUITS		0.4/4	5,000/12,500		0.01/0.25	0.05/5		0.1/0.5		
PROCESSED VEGETABLES	0.5/1				0.01/0.25		0.5/4			
RECONSTITUTED VEGETABLES					0.01/0.25		0.5/4			
SEASONINGS AND FLAVORS	0.5/1	0.2/2			0.01/0.25	0.5/20	1/4	0.1/0.5	0.1/1	50/300
SNACK FOODS	0.5/2	0.2/2			0.01/0.25		1/4	0.1/0.5	0.0001/0.001	5/40
SOFT CANDY		0.4/4			0.01/0.25	0.2/5		0.5/2	0.0001/0.001	
SOUPS	0.2/1				0.01/0.25		1/4		0.0001/0.001	5/20
SUGAR SUBSTITUTES					0.005/0.15					
SWEET SAUCES		0.2/2			0.005/0.15	0.2/10	0.5/2			

	1-(4-Methyl-3-cyclohexen-1-yl)-ethanone	1,1-Propanedithioacetate	2-Pyrrolidone	7,8-Dihydroxyflavone	Katemfe fruit extract	2-(3-Benzoyloxypropyl)pyridine	(2S)-3'-7-Dihydroxy-8-methyl-4'-methoxyflavan	(R)-5-Hydroxy-4-(4'-hydroxy-3'-methoxyphenyl)-7-methylchroman-2-one	2,4-Dihydroxy-N-[(4-hydroxy-3-methoxyphenyl)methyl]benzamide	10% Solution of 3,4-dimethyl-2,3-dihydrothiophene-2-thiol	<i>Chrysanthemum parthenium</i> extract
CATEGORY	4827	4828	4829	4830	4831	4832	4833	4834	4835	4836	4837
BAKED GOODS	0.5/1.5	0.1/0.5	5/20		4/10	1/10				0.04/0.4	
BEVERAGES, NONALCOHOLIC	0.05/0.25		5/20	5/15	4/10	0.1/1	30/50	15/20	10/100	0.01/0.05	30/60
BEVERAGES, ALCOHOLIC	0.5/2.5		5/20	5/15	4/10		30/50	15/20		0.03/0.15	30/60
BREAKFAST CEREALS	0.5/2.5	0.1/0.2	5/20		4/10				10/100		
CHEESES	0.2/2.5	0.1/0.3	5/20		4/10	1/10				0.01/1	
CHEWING GUM	0.5/2.5		50/200	100/1,000	4/10		30/50	15/20		0.03/0.3	300/1,000
CONDIMENTS AND RELISHES	0.2/2.5	0.2/3	5/20	10/30	4/10					0.01/1	50/200
CONFECTIONS AND FROSTINGS	0.5/2.5		10/40		4/10		30/50	15/20		0.03/0.3	
EGG PRODUCTS	0.05/0.25		5/20		4/10	0.2/2					
FATS AND OILS	0.5/2.5		5/20							0.01/0.5	
FISH PRODUCTS	0.05/0.15		5/20		4/10	0.5/5					50/200
FROZEN DAIRY	0.5/2.5		5/20		4/10	0.1/1					
FRUIT ICES	0.5/2.5		5/20	5/15	4/10					0.04/0.4	50/200
GELATINS AND PUDDINGS	0.5/1.5		5/20		4/10					0.03/0.3	
GRANULATED SUGAR	0.25/0.85		40/160								
GRAVIES	0.05/0.5	0.3/3	5/20	10/30	4/10	1/10				0.01/1	50/200
HARD CANDY	0.5/2.5		10/40	50/200	4/10					0.04/0.4	250/500
IMITATION DAIRY	0.5/2.5		5/20		4/10	0.5/5					
INSTANT COFFEE AND TEA	0.05/0.25		5/20	5/15	4/10						
JAMS AND JELLIES	0.5/1.5		10/40		4/10					0.04/0.4	50/200
MEAT PRODUCTS	0.05/0.15	0.5/2	5/20	10/30	4/10	0.5/5				0.01/1	
MILK PRODUCTS	0.25/0.85		5/20		4/10	0.2/2			10/100		
NUT PRODUCTS	0.05/0.25		5/20		4/10	0.1/1					
OTHER GRAINS	0.5/2.5		5/20		4/10						
POULTRY	0.05/0.25		5/20	10/30	4/10					0.01/1	
PROCESSED FRUITS	0.5/2.5		5/20		4/10						50/200
PROCESSED VEGETABLES	0.2/2	0.2/1	5/20		4/10	0.1/1				0.01/1	
RECONSTITUTED VEGETABLES	0.05/0.15	0.2/1	5/20		4/10	0.1/1					
SEASONINGS AND FLAVORS	0.05/0.5	0.1/2	5/20	30/100	4/10	1/10				0.01/1	400/800
SNACK FOODS	0.05/0.5	0.1/2	5/20	50/200	4/10	1/10				0.01/1	400/800
SOFT CANDY	0.5/2.5		10/40	50/200	4/10					0.04/0.4	250/500
SOUPS	0.25/2	0.3/1	5/20	10/20	4/10	0.5/5				0.01/1	
SUGAR SUBSTITUTES	0.5/1.5		10/40								
SWEET SAUCES	0.5/1.5		5/20		4/10						

TABLE 2 CONTINUED - Average Usual Use Levels/Average Maximum Use Levels

Average Usual Use Levels (ppm)/Average Maximum Use Levels (ppm) for new FEMA GRAS Flavoring Substances on which the FEMA Expert Panel based its judgements that the substances are generally recognized as safe (GRAS)

	Valencene 80 extract	Mixture of 3- and 4-butyl-2-thiophenecarboxaldehyde	(±)-Tetrahydronootkatone	cis-5-Dodecenyl acetate	2,4,5-Trithiaoctane	3-(Allyldithio)butan-2-one	(2E,4E)-2,4-Deradien-1-ol acetate	Glucosylated Stevia Extract	Grapefruit essence oil (Citrus paradisi Macf.)	Grapefruit essence oil terpeneless (Citrus paradisi Macf.)	Lemon terpenes
CATEGORY	4838	4839	4840	4841	4842	4843	4844	4845	4846	4847	4848
BAKED GOODS	0.9/0.9				0.1/0.5	0.1/8		30/100	363/5,000	45/1,000	366/5,000
BEVERAGES, NONALCOHOLIC	0.6/0.6	0.2/5	0.2/5	0.05/5			0.1/5	30/100	78/500	11/275	70/500
BEVERAGES, ALCOHOLIC	0.9/0.9	0.5/10	0.5/5	0.15/10			0.3/15	30/100	91/500	16/100	81/1,000
BREAKFAST CEREALS	0.9/0.9				0.01/0.05			30/100	133/1,000	28/200	102/1,000
CHEESES					0.01/2	0.03/3		30/100	200/1,000	40/200	200/1,000
CHEWING GUM	20/1,000	1/20	1/10	0.5/25			1/40	30/100	1,341/20,000	253/5,000	1,355/20,000
CONDIMENTS AND RELISHES					0.1/2	0.2/3		30/100	88/500	9/100	68/500
CONFECTIONS AND FROSTINGS	0.9/0.9	0.6/10	0.6/5	0.25/10			0.5/20	30/100	385/5,000	55/1,000	393/5,000
EGG PRODUCTS					0.03/0.3	0.1/0.5			1,000/5,000	200/1,000	1,000/5,000
FATS AND OILS		0.5/10	0.5/2	0.2/10	0.03/0.3	0.1/0.5	0.5/20		41/500	10/100	47/500
FISH PRODUCTS									51/180	0.2/2	41/180
FROZEN DAIRY	0.9/0.9	0.2/5	0.2/1	0.05/5			0.1/10	30/100	142/1,000	26/200	172/1,000
FRUIT ICES		0.2/5	0.2/5	0.05/5			0.1/5	30/100	110/1,000	21/200	136/1,000
GELATINS AND PUDDINGS	0.9/0.9							30/100	238/1,000	25/200	238/2,000
GRANULATED SUGAR									100/500	10/30	100/500
GRAVIES					0.1/2	0.1/2.5		30/100	200/1,000	40/200	200/1,000
HARD CANDY		0.6/10	0.6/5	0.25/10			0.5/25	30/100	359/5,000	59/1,000	392/5,000
IMITATION DAIRY						0.1/1		30/100	153/500	38/180	253/900
INSTANT COFFEE AND TEA		0.3/5	0.3/5	0.2/5			0.2/10	30/100	75/500	20/100	113/1,000
JAMS AND JELLIES		0.5/10	0.5/2	0.2/10			0.5/15	30/100	375/5,000	75/1,000	372/5,000
MEAT PRODUCTS					0.1/5	0.1/3			2/20	2/6	2/20
MILK PRODUCTS	0.9/0.9							50/100	92/500	26/150	177/750
NUT PRODUCTS								30/100	100/500	20/100	100/500
OTHER GRAINS								30/100	100/500	20/100	50/500
POULTRY					0.1/5	0.05/0.5			26/100	0.2/2	30/100
PROCESSED FRUITS		0.2/5	0.2/5	0.1/5		0.1/0.5	0.2/10	30/100	200/1,000	44/210	327/1,050
PROCESSED VEGETABLES					0.1/2			30/100	100/500	20/100	100/500
RECONSTITUTED VEGETABLES								30/100			
SEASONINGS AND FLAVORS		0.5/10	0.05/2	0.2/5	0.1/5	0.01/8	0.4/10	30/100	351/5,000	340/5,000	1,735/5,000
SNACK FOODS					0.1/5	0.2/2		30/100	117/1,000	15/200	101/1,000
SOFT CANDY		0.6/10	0.6/3	0.25/5			0.5/10	30/100	342/5,000	50/1,000	331/5,000
SOUPS					0.1/2	0.1/1		10/50	50/250	10/50	26/250
SUGAR SUBSTITUTES									100/500	20/100	100/500
SWEET SAUCES								30/100	253/2,000	28/200	354/5,000

	Lime terpenes	Orange terpenes	Grapefruit terpenes	Lemon essence oil (<i>Citrus limon</i> (L.) Burm. f.)	Petigrain oil terpeneless	Jangelo oil (<i>Citrus paradisi</i> Mact. x <i>Citrus tangerine</i> hort. ex Tanaka)	Clementine oil (<i>Citrus clementina</i> hort. ex Tanaka)	Blood orange oil (<i>Citrus sinensis</i> (L.) Osbeck 'Blood orange')	Iyokan oil (<i>Citrus iyo</i>)	Hassaku oil (<i>Citrus hassaku</i>)
CATEGORY	4849	4850	4851	4852	4853	4854	4855	4856	4857	4858
BAKED GOODS	440/5,000	470/5,000	564/5,000	291/5,000	60/1,000	491/5,000	516/5,000	501/5,000		125/300
BEVERAGES, NONALCOHOLIC	81/750	80/1,550	98/500	53/500	31/500	72/500	70/500	102/2,400	34/64	14/60
BEVERAGES, ALCOHOLIC	93/1,000	93/1,000	115/1,000	93/1,000	36/500	92/500	114/1,000	90/1,000	37/74	16/36
BREAKFAST CEREALS	104/1,000	101/1,000	133/1,000	122/1,000	200/1,000	133/1,000	133/1,000	100/1,000		50/100
CHEESES	200/1,000	100/1,000	200/1,000	200/1,000	200/1,000	200/1,000	200/1,000	200/1,000		60/275
CHEWING GUM	2,240/20,000	1,943/20,000	1,504/20,000	1,530/20,000	1,070/20,000	1,524/20,000	1,484/20,000	1,829/20,000	300/1,000	125/350
CONDIMENTS AND RELISHES	90/500	71/500	93/500	108/500	48/500	88/500	92/500	49/500	100/200	20/50
CONFECTIONS AND FROSTINGS	474/5,000	489/5,000	600/5,000	322/5,000	116/1,000	495/5,000	528/5,000	470/5,000		2/20
EGG PRODUCTS	1,000/5,000	1,000/5,000	1,000/5,000	1,000/5,000	200/1,000	1,000/5,000	1,000/5,000	1,000/5,000		
FATS AND OILS	47/500	43/500	43/500	38/500	51/500	41/500	42/500	43/500	100/200	60/125
FISH PRODUCTS	34/180	38/180	55/180	55/180	0.2/1	51/180	53/180	55/180		30/80
FROZEN DAIRY	205/1,000	215/1,000	215/1,000	123/1,000	70/1,000	160/1,000	198/1,000	150/1,000		12/35
FRUIT ICES	164/1,000	166/1,000	200/1,000	106/1,000	85/1,000	148/1,000	170/1,000	138/1,000	63/123	20/43
GELATINS AND PUDDINGS	303/2,000	323/2,000	323/2,000	220/2,000	70/1,000	237/1,000	234/2,000	228/2,000	88/168	28/59
GRANULATED SUGAR	100/500	100/500	100/500	100/500		100/500	100/500	100/500		
GRAVIES	200/1,000	200/1,000	200/1,000	121/1,000	100/1,000	200/1,000	200/1,000	73/1,000		
HARD CANDY	542/5,000	507/5,000	550/5,000	370/5,000	99/1,000	359/5,000	407/5,000	416/5,000	192/312	70/135
IMITATION DAIRY	253/900	190/900	253/900	153/500	140/500	173/540	193/660	193/660		11/35
INSTANT COFFEE AND TEA	100/500	113/1,000	113/1,000	88/1,000	45/500	80/500	93/1,000	98/1,000		
JAMS AND JELLIES	463/5,000	475/5,000	475/5,000	326/5,000	93/36,526	388/5,000	418/5,000	352/5,000	88/168	34/90
MEAT PRODUCTS	2/20	10/50	10/50	18/50	0.2/1	2/20	5/25	15/50		30/80
MILK PRODUCTS	179/750	181/788	233/750	113/500	84/500	150/500	183/550	183/550		
NUT PRODUCTS	100/500	50/500	100/500	100/500	100/500	100/500	100/500	100/500		
OTHER GRAINS	100/500	100/500	100/500	100/500	100/500	100/500	100/500	100/500		
POULTRY	26/100	30/100	30/100	30/100	0.2/1	26/100	28/100	30/100		
PROCESSED FRUITS	307/1,050	333/1,050	333/1,050	217/1,000	137/1,000	223/1,000	257/1,000	263/1,000		
PROCESSED VEGETABLES	100/500	100/500	100/500	100/500	100/500	100/500	100/500	100/500		
RECONSTITUTED VEGETABLES										
SEASONINGS AND FLAVORS	1,727/5,000	1,738/5,000	2,600/5,000	600/5,000	501/5,000	2,600/5,000	2,600/5,000	2,600/5,000	24/45	30/80
SNACK FOODS	163/1,000	100/1,000	133/1,000	133/1,000	101/1,000	117/1,000	127/1,000	174/1,000	100/300	75/150
SOFT CANDY	477/5,000	449/5,000	476/5,000	304/5,000	95/1,000	472/5,000	562/5,000	418/5,000	188/368	70/169
SOUPS	27/250	29/250	50/250	28/250	50/250	50/250	50/250	50/250		20/50
SUGAR SUBSTITUTES	100/500	50/500	100/500	100/500	100/500	100/500	100/500	100/500		
SWEET SAUCES	440/5,000	440/5,000	440/5,000	264/5,000	117/1,000	265/2,000	328/3,500	270/5,000	100/200	35/125

TABLE 2 CONTINUED - Average Usual Use Levels/Average Maximum Use Levels

Average Usual Use Levels (ppm)/Average Maximum Use Levels (ppm) for new FEMA GRAS Flavoring Substances on which the FEMA Expert Panel based its judgements that the substances are generally recognized as safe (GRAS)

	Sikwasaja oil (<i>Citrus depressa</i>)	Netsumikan oil (<i>Citrus natsudaidai</i>)	Mikan oil (<i>Citrus unshiu</i>)	Yuzu oil (<i>Citrus junos</i> (Sieb.) c. Tanaka)	Sudachi oil (<i>Citrus sudachi</i> hort. ex Shirai)	Kabosu oil (<i>Citrus sphaerocarpa</i>)	Ponkan oil (<i>Citrus reticulata</i> Blanco 'Ponkan')	Orange essence water phase (<i>Citrus sinensis</i> (L.) Osbeck)	(3S,5R,8S)-3,8-Dimethyl-5-prop-1-en-2-yl-3,4,5,6,7,8-hexahydro-2H-azulen-1-one	4-(4-Methyl-3-penten-1-yl)-2(5H)-furanone
CATEGORY	4859	4860	4861	4862	4863	4864	4865	4866	4867	4868
BAKED GOODS		400/860	50/200	60/184	2/2		463/746	556/10,000	0.001/0.02	0.0001/0.001
BEVERAGES, NONALCOHOLIC	20/40	113/276	24/55	14/45	12/31	11/24	59/110	537/5,000	0.0001/0.005	0.00001/0.0001
BEVERAGES, ALCOHOLIC		106/160	24/44	25/71	11/24	13/23	61/140	802/10,000	0.0001/0.005	0.00001/0.0001
BREAKFAST CEREALS			50/200	50/200				40/200		0.0001/0.001
CHEESES			30/60	33/170				40/200		0.001/0.01
CHEWING GUM		844/1,608	100/200	384/1,150			360/1,100	1,498/8,000	0.001/0.02	0.0001/0.001
CONDIMENTS AND RELISHES			30/60	37/100				250/5,000		
CONFECTIONS AND FROSTINGS		440/800		8/9			560/880	356/2,000	0.0003/0.005	0.0001/0.001
EGG PRODUCTS								200/1,000	0.0003/0.005	0.0001/0.001
FATS AND OILS			30/60	30/150					0.02/0.2	0.001/0.01
FISH PRODUCTS			30/60	18/70					0.0003/0.005	0.0001/0.001
FROZEN DAIRY		175/400	30/60	18/65			219/440	334/5,000	0.0002/0.003	0.0001/0.001
FRUIT ICES		240/400	25/45	16/57	3/10	5/5	280/440	334/5,000	0.0002/0.003	0.00001/0.0001
GELATINS AND PUDDINGS		313/883	45/75	24/64	9/30	15/15	239/440	168/1,000	0.0003/0.002	0.0001/0.001
GRANULATED SUGAR										
GRAVIES								40/200	0.001/0.01	0.001/0.01
HARD CANDY		342/1,978	55/145	64/154	9/30	15/15	318/1,965	952/8,000	0.001/0.01	0.0001/0.001
IMITATION DAIRY		360/600	30/60	19/98			420/660	550/2,000	0.001/0.01	0.0001/0.001
INSTANT COFFEE AND TEA		120/200					140/220	300/500	0.0001/0.001	0.00001/0.0001
JAMS AND JELLIES		300/500	45/75	28/79	3/90	15/15	250/550	256/1,250		
MEAT PRODUCTS			30/60	18/70						0.00001/0.0001
MILK PRODUCTS		180/500		15/76			350/550	360/2,000	0.001/0.01	0.00001/0.0001
NUT PRODUCTS									0.001/0.01	0.0001/0.001
OTHER GRAINS										0.0001/0.001
POULTRY										
PROCESSED FRUITS		420/700		20/50			490/770	528/5,000		0.00001/0.0001
PROCESSED VEGETABLES				20/50				200/2,000		
RECONSTITUTED VEGETABLES										
SEASONINGS AND FLAVORS			20/37	25/90	3/10	5/5		1,200/10,000	0.1/1	0.01/0.1
SNACK FOODS			50/200	47/114				40/200	0.001/0.01	0.0001/0.001
SOFT CANDY		552/1,084	55/145	98/284	55/165	15/15	595/1,251	313/2,000	0.001/0.01	0.0001/0.001
SOUPS			30/60	13/60				50/250	0.0001/0.002	0.0001/0.001
SUGAR SUBSTITUTES										
SWEET SAUCES		300/500	30/60	14/64			350/550	450/5,000	0.001/0.01	

	4-(1-Menthoxyl)-2-butanone	2-Ethyl-4-methyl-1,3-dithiolane	2-Phenoxyethyl 2-(4-hydroxy-3-methoxyphenyl)acetate	3-(3-Hydroxy-4-methoxyphenyl)-1-(2,4,6-trihydroxyphenyl)propan-1-one	Watermint, <i>Mentha aquatica</i> L., extract	Enzyme Modified Stevia, stevioside 20%	(F)-3-(3,4-Dimethoxyphenyl)-N-[2-(4-methoxyphenyl)-ethyl]-acrylamide	<i>Cordyceps sinensis</i> fermentation product
CATEGORY	4869	4870	4871	4872	4873	4876	4877	4878
BAKED GOODS		1/2	75/150	5/10	50/100	75/100		30/50
BEVERAGES, NONALCOHOLIC	1/5	1/2	10/20	1.5/10		90/120		40/1,000
BEVERAGES, ALCOHOLIC	1/5	1/2	10/30	1.5/10		75/100		100/1,000
BREAKFAST CEREALS			5/15	5/10		75/100	15/30	
CHEESES		1/2	50/100		100/400	75/100	20/50	
CHEWING GUM	1/10		2,000/5,000	5/10		75/100		
CONDIMENTS AND RELISHES		1/2	15/50	4/10	200/800	80/110	25/50	
CONFECTIONS AND FROSTINGS			50/200			80/110		
EGG PRODUCTS		1/2	5/10		200/800	80/110		
FATS AND OILS		1/2	50/100		200/800	80/110	20/50	
FISH PRODUCTS		1/2	20/50		50/100	75/100	15/50	
FROZEN DAIRY			30/60	3/10		90/120		
FRUIT ICES			5/10	5/10		75/100		
GELATINS AND PUDDINGS			10/20	3/10		80/110		
GRANULATED SUGAR			5/10					
GRAVIES	1/5	1/2	15/50	2/10	200/800	75/100	20/50	
HARD CANDY			100/300	2/10		80/110		
IMITATION DAIRY			20/50		100/200	90/120		
INSTANT COFFEE AND TEA	1/5		10/20	1.5/10		75/100		
JAMS AND JELLIES			5/10			80/110		
MEAT PRODUCTS		1/2	25/50		100/200	75/100	20/50	
MILK PRODUCTS			20/50	2/10	50/100	90/120		15/100
NUT PRODUCTS			100/250		50/100	75/100		
OTHER GRAINS			5/15			75/100		50/150
POULTRY		1/2	25/50		100/200	75/100	15/50	
PROCESSED FRUITS			5/10	3/10		80/110		
PROCESSED VEGETABLES		1/2	5/10	2/10	50/100	75/100		
RECONSTITUTED VEGETABLES			5/10	2/10	50/100	75/100	20/50	
SEASONINGS AND FLAVORS	1,000/5,000	1/2	100/200	2/10	50/100	75/100	50/80	
SNACK FOODS		1/2	75/500	6/10	100/400	75/100	50/80	
SOFT CANDY	1/5		50/100	5/10		80/110		
SOUPS	1/5	1/2	35/100	1/10	100/200	75/100	20/50	
SUGAR SUBSTITUTES			5/10					4/10
SWEET SAUCES			15/50	4/10		80/110		

TABLE 3 - Updated Average Usual Use Levels/Average Maximum Use Levels

Average Usual Use Levels (ppm)/Average Maximum Use Levels (ppm) for flavoring substances previously recognized as FEMA GRAS
Superscript 'a' represents a new use level

	Cinnamic Acid	Thaumatococin	Neesperidine dihydrochalcone	Thaumatococin B - Recombinant	(+/-)-(2,6,6-Trimethyl-2-hydroxycyclohexylidene)acetic acid <i>gamma</i> -lactone	Geranic Acid	Polyglycerol Ester of Fatty Acids	Rebaudioside A	N-(2-Methylcyclohexyl)-2,3,4,5,6-pentafluorobenzamide	(2S,5R)-N-[4-(2-Amino-2-oxoethyl)phenyl]-5-methyl-2-(propan-2-yl)cyclohexanecarboxamide
FEMA NO.	2288	3732	3811	3814	4020	4121	4201	4601	4678	4684
GRAS PUBLICATION	3	13	17	17	20	22	22	24	25	25
CATEGORY										
BAKED GOODS	232/384	7 ^a /7 ^a	5/7 ^a	1/1	5 ^a /20 ^a	10/50	6/6		1 ^a /5 ^a	0 ^a /0 ^a
BEVERAGES, NONALCOHOLIC	300/400	7 ^a /7 ^a	5/15	5/7 ^a	5 ^a /20 ^a	3/15	4 ^a /20 ^a	20/30	1/5	10 ^a /50 ^a
BEVERAGES, ALCOHOLIC	570/712	7 ^a /7 ^a	5/15	5/7 ^a	5 ^a /20 ^a		4 ^a /20 ^a	20/30	1 ^a /3 ^a	
BREAKFAST CEREALS		7 ^a /7 ^a	8/20	1/2	5 ^a /20 ^a	5/25	6/20	20/30	1 ^a /5 ^a	
CHEESES		7 ^a /7 ^a	3/4	7 ^a /7 ^a	5 ^a /20 ^a	3/15				0 ^a /0 ^a
CHEWING GUM	224/300	150 ^a /150 ^a	200/300	150/150 ^a	50 ^a /200 ^a	165 ^a /500 ^a		200/200	10/20	400 ^a /800 ^a
CONDIMENTS AND RELISHES		7 ^a /7 ^a	2/3	1/2	5 ^a /20 ^a	5/25	6/200	20/30	1 ^a /25 ^a	0 ^a /0 ^a
CONFECTIONS AND FROSTINGS		7 ^a /7 ^a	3/3	2/5	10 ^a /40 ^a	10/50		20/30	1/5	25 ^a /100 ^a
EGG PRODUCTS		7 ^a /7 ^a	2/3	2/5	5 ^a /20 ^a					
FATS AND OILS	746/1,000	7 ^a /7 ^a	4/4		5 ^a /20 ^a	2/10				
FISH PRODUCTS		7 ^a /7 ^a	2/3	5/7 ^a	5 ^a /20 ^a	2/10			1 ^a /2 ^a	
FROZEN DAIRY	192/263	7 ^a /7 ^a	2/8	1/2	5 ^a /20 ^a	3/15		20/30	1/8 ^a	
FRUIT ICES		7 ^a /7 ^a	2/3	2/5	5 ^a /20 ^a	3/15		20/30	1/5	
GELATINS AND PUDDINGS	459/500	7 ^a /7 ^a	3/8	1/2	5 ^a /20 ^a	5/25		20/30	1/5	
GRANULATED SUGAR										
GRAVIES	746/1,000	7 ^a /7 ^a	3/4	2/5	5 ^a /20 ^a	15/75	60/400	20/30	1 ^a /25 ^a	0 ^a /0 ^a
HARD CANDY	0.01/0.01	7 ^a /7 ^a	5/15	2/5	10 ^a /40 ^a	100 ^a /400 ^a		20/30	1/5	25 ^a /100 ^a
IMITATION DAIRY		7 ^a /7 ^a	3/10	7 ^a /7 ^a	5 ^a /20 ^a	3/15		20/30	1 ^a /8 ^a	
INSTANT COFFEE AND TEA	224/300	7 ^a /7 ^a	3/6	2/5	5 ^a /20 ^a			20/30	1/5	0 ^a /0 ^a
JAMS AND JELLIES	373/500	7 ^a /7 ^a	2/3	2/5	10 ^a /40 ^a	5/25		20/30	1 ^a /5 ^a	25 ^a /100 ^a
MEAT PRODUCTS		7 ^a /7 ^a	2/3	2/2		2/10		20/75	1 ^a /2 ^a	
MILK PRODUCTS	700 ^a /1,000 ^a	7 ^a /7 ^a	3/10	3/6	5 ^a /20 ^a	3/15		20 ^a /30 ^a	1/8 ^a	
NUT PRODUCTS		7 ^a /7 ^a	3/4	5/7 ^a	5 ^a /20 ^a				1 ^a /5 ^a	
OTHER GRAINS		7 ^a /7 ^a	3/4		5 ^a /20 ^a	5/25			1 ^a /5 ^a	
POULTRY		7 ^a /7 ^a	2/3	2/5	5 ^a /20 ^a	2/10		20/75	1 ^a /2 ^a	
PROCESSED FRUITS	37/50	7 ^a /7 ^a	2/3	2/5		2/10		20/30	1/5	
PROCESSED VEGETABLES		7 ^a /7 ^a	2/3	2/5				20/30		
RECONSTITUTED VEGETABLES		7 ^a /7 ^a	2/3	2/5	5 ^a /20 ^a					
SEASONINGS AND FLAVORS		7 ^a /7 ^a	3/4	0.5/1	5 ^a /20 ^a	5/25	2.3/15	20/30	1 ^a /25 ^a	
SNACK FOODS		7 ^a /7 ^a	3/3	1/2	5 ^a /20 ^a	10/50	0.2/40	20/30	1 ^a /25 ^a	0 ^a /0 ^a
SOFT CANDY	249/356	7 ^a /7 ^a	4/10	2/5	10 ^a /40 ^a			20/30	1/5	25 ^a /100 ^a
SOUPS		7 ^a /7 ^a	5/7 ^a	2/5	5 ^a /20 ^a	5/25		20/30	1 ^a /2 ^a	
SUGAR SUBSTITUTES	746/1,000		0 ^a /0 ^a	0 ^a /0 ^a						
SWEET SAUCES	746/1,000	7 ^a /7 ^a	2/3	2/5	5 ^a /20 ^a	5/25		20/30	1/5	

* Figures in parentheses represent the amount of diluted Sugar Cane Distillate in the commercial product as used in food.

	3-[(4-Amino-2,2-dioxido-1H-2,1,3-benzothiazin-5-yl)oxy]-2,2-dimethyl-N-propylpropanamide	Glucosyl steviol glycosides	4-Amino-5-(β-(isopropylamino)-2,2-dimethyl-3-oxopropoxy)-2-methylquinoline-3-carboxylic acid	Glucosylated <i>Rubus suavissimus</i> extract, 20-30% glucosylated rubusoside glycosides	(S)-1-(3-(((4-Amino-2,2-dioxido-1H-benzo[1,2,6]thiazin-5-yl)oxy)methyl)piperidin-1-yl)-3-methylbutan-1-one	2-(4-Methylphenoxy)-N-(1H-pyrazol-3-yl)-N-(thiophen-2-ylmethyl)acetamide	Palmitoylated Green Tea Extract Catechins	Sugar Cane Distillate*
FEMA NO.	4701	4728	4774	4800	4802	4809	4812	4816
GRAS PUBLICATION	25	26	26	27	27	27	27	27
CATEGORY								
BAKED GOODS	10/22	150*/500 ^a	10*/30 ^a		6/6	3*/15 ^a	100/400 ^a	0.01(2,250)/0.01(2,250)
BEVERAGES, NONALCOHOLIC		125/175 ^a	8/30	150/350	2.5/6	1/3		0.016(3,600)*/0.016(3,600) ^a
BEVERAGES, ALCOHOLIC	5/22	125/175 ^a	10/30	75/200	2.5/6	2/6		
BREAKFAST CEREALS	15/22	200*/500 ^a	12/30	150/400	6/6	3*/15 ^a	50/600 ^a	
CHEESES		100/133 ^a						
CHEWING GUM	30/300	500*/1,500 ^a	30/300	400*/1,000 ^a	6/6	75/150		
CONDIMENTS AND RELISHES	3/22	125/200 ^a	8/30		6/6	3*/15 ^a	100/600 ^a	
CONFECTIONS AND FROSTINGS	10/22	50/100	30/300	150*/300 ^a	6/6	5*/30 ^a	50/600 ^a	0.01(2,250)/0.01(2,250)
EGG PRODUCTS						3*/15 ^a	150*/600 ^a	
FATS AND OILS		125/189 ^a	8/30		3/6	3*/15 ^a	200/2,800 ^a	
FISH PRODUCTS	10*/22 ^a						250/600 ^a	
FROZEN DAIRY	5/22	125/133 ^a	10*/30 ^a	200/300	3/6	1/3		0.016(3,600)*/0.016(3,600) ^a
FRUIT ICES	5/22	125/133 ^a	10/30	100/300	3/6	1/3		
GELATINS AND PUDDINGS	5/22	125/133 ^a	8/30	150*/300 ^a	3/6	1/3		
GRANULATED SUGAR								
GRAVIES		125/133 ^a	8/30	100/150	3/6	3*/15 ^a	150*/600 ^a	
HARD CANDY	15/75	100/133 ^a	10/30	400*/1,000 ^a	3/6	5/15		
IMITATION DAIRY	5*/22 ^a	125/250 ^a	8/30		2.5/6	1/3	150*/600 ^a	0.016(3,600)*/0.016(3,600) ^a
INSTANT COFFEE AND TEA	5*/22 ^a	125/175 ^a	8/30	150/350	2.5/6	1/3	150*/500 ^a	
JAMS AND JELLIES	10/22	125*/200 ^a	10/30	150*/300 ^a	6/6	1*/3 ^a		
MEAT PRODUCTS	10*/22 ^a			100/150		3*/15 ^a	250/400 ^a	
MILK PRODUCTS	3/22	133*/225 ^a	8/30	200/300	2.5/6	1/3	150*/400 ^a	0.016(3,600)*/0.016(3,600) ^a
NUT PRODUCTS		133*/175 ^a			3/6	1*/3 ^a	50/600 ^a	
OTHER GRAINS		100/133 ^a					150/400 ^a	
POULTRY	10*/22 ^a					3*/15 ^a	250/400 ^a	
PROCESSED FRUITS		133*/200 ^a	10*/30 ^a		3/6	1*/3 ^a		
PROCESSED VEGETABLES		100/133 ^a				3*/15 ^a		
RECONSTITUTED VEGETABLES		133*/133 ^a				3*/15 ^a		
SEASONINGS AND FLAVORS	10*/22 ^a	133*/175 ^a	10*/30 ^a	100/150	3*/6 ^a	3*/15 ^a	750*/1,500 ^a	
SNACK FOODS		133*/133 ^a	12/30		6/6	3*/15 ^a	100/600 ^a	0.01(2,250)/0.01(2,250)
SOFT CANDY	15/75	100/133 ^a	10/30	400*/1,000 ^a	6/6	5/15	50/600 ^a	
SOUPS		133*/133 ^a	8/30	100/150	3/6	3*/15 ^a	100/600 ^a	
SUGAR SUBSTITUTES		0*/0 ^a						
SWEET SAUCES	10/22	133*/133 ^a	15/30		3/6	5/15	150*/600 ^a	0.01(2,250)/0.01(2,250)