

THE
MERCK
INDEX
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THIRTEENTH EDITION

THE MERCK INDEX

AN ENCYCLOPEDIA OF
CHEMICALS, DRUGS, AND BIOLOGICALS

THIRTEENTH EDITION

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(1931); Willstätter, Page, *Ann.* **404**, 237 (1914). Structure: Bonnet et al., *Chem. Commun.* **1966**, 515; *J. Chem. Soc. (C)* **1969**, 429. Abs config: DeVille et al., *Chem. Commun.* **1969**, 1311; K. Bernhard et al., *Tetrahedron Letters* **1976**, 115.

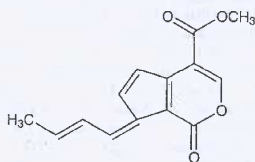
Needles from ether + petr ether, mp 160°. $[\alpha]_D^{18} +72.5 \pm 9^\circ$ (chloroform). Abs max (chloroform): 492, 457 nm. Abs max (ethanol): 450 nm ($E_{1\text{cm}}^{1\%}$ 1140), Antia, *Can. J. Chem.* **43**, 302 (1965). Freely sol in ethanol; less sol in carbon disulfide; sparingly sol in ether. Practically insol in petr ether. 1.66 g dissolves in 100 g boiling methanol.

4304. Fucus. Bladder-wrack; sea-wrack; bladder fucus; kelpware; black-tang; cut-weed; sea-oak. Dried thallus of *Fucus vesiculosus* L., *F. serratus* L., or *F. siliculosus* L. *Fucaceae*. Habit. Atlantic and Pacific Oceans. *Constit.* Algin, about 0.01% iodine and some bromine mannite.

4305. Fuller's Earth. Floridin. A nonplastic variety of kaolin containing an aluminum magnesium silicate. The name is derived from an ancient process of cleaning or fulling wool, to remove the oil and dirt particles, with a water slurry of earth or clay. At the present time, the term fuller's earth is applied to any clay that has adequate decolorizing and purifying capacity to be used commercially in oil refining without chemical treatment. It is sometimes considered to be synonymous with *montmorillonite*, *q.v.*, *kaolinite* ($\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$) and *Halloysite* ($\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 4\text{H}_2\text{O}$). A long list of minerals likely to be found in fuller's earth is given by Porter, *U.S. Geol. Survey, Bull.* **315**, 268 (1907), *C.A.* **1**, 1684 (1907), and the opinion is expressed that fuller's earth results from the decompn of hornblendes and augites rather than from feldspars. Fuller's earth has for its base a series of amorphous, hydrous aluminum silicates that have a rather persistent colloidal (used in its widest sense) structure. It is to this colloidal structure, which is not lost at 130° and possibly higher, that the bleaching power is due. The bleaching efficiency of fuller's earth is usually increased by treatment with dilute acids.

USE: Decolorizer for oils and other liquids; filtering medium; filler for rubber; in agricultural formulations; also instead of absorbent charcoal.

4306. Fulvoplumierin. [20867-01-0] (7*E*)-7-(2*E*)-Butenylidene-1,7-dihydro-1-oxocyclopenta[*c*]pyran-4-carboxylic acid methyl ester; 3-(2-butenylidene)-2-carboxy- α -(hydroxymethylene)-1,4-cyclopentadiene-1-acetic acid δ -lactone methyl ester; methyl 7-crotonylidenecyclopenta[*c*]pyran-1-(7*H*)-one-4-carboxylate. $\text{C}_{14}\text{H}_{12}\text{O}_4$; mol wt 244.24. C 68.85%, H 4.95%, O 26.20%. Occurs together with plumieride and plumiericin. Isolated from *Plumeria acutifolia* Poir., *Apocynaceae*, also from roots of *P. rubra* var *alba*: Grumbach et al., *Experientia* **8**, 224 (1952). Structure: Schmid, Benzene, *Helv. Chim. Acta* **36**, 206, 1468 (1953). Stereochemistry: Albers-Schönberg et al., *ibid.* **45**, 1406 (1962). Synthesis: Büchi, Carlson, *J. Am. Chem. Soc.* **90**, 5336 (1968); **91**, 6470 (1969).

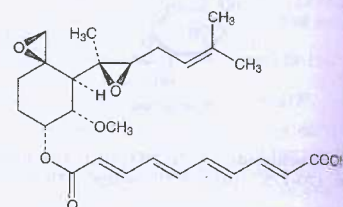


Orange needles from chloroform + petr ether, ethyl acetate, or alcohol, dec 151-152°. Sublimes in high vacuum. uv max (ethanol): 272, 365 nm (ϵ 7,000; 33,700). Sol in chloroform, hot ethyl acetate, benzene, alcohol; less sol in pyridine, acetone. Practically insol in water, petr ether.

4307. Fumagillin. [23110-15-8] [3*R*-[3 α ,4 α (2*R**,3*R**),-5 β ,6 β (*all-E*)]]-2,4,6,8-Decatetraenedioic acid, mono[5-methoxy-4-[2-methyl-3-(3-methyl-2-butenyl)oxiranyl]-1-oxaspiro[2.5]oct-6-yl]ester; 2,4,6,8-decatetraenedioic acid mono[4-(1,2-epoxy-1,5-dimethyl-4-hexenyl)-5-methoxy-1-oxaspiro[2.5]oct-

6-yl] ester; Amebacilin; Fugillin; Fumadil B; Fumidil. $\text{C}_{27}\text{H}_{36}\text{O}_7$; mol wt 458.54. C 68.10%, H 7.47%, O 24.42%. Antibiotic substance produced by *Aspergillus fumigatus*: T. E. Eble, F. R. Hanson, *Antibiot. & Chemother.* **1**, 55 (1951); F. R. Hanson, T. E. Eble, *US 2652356* (1953 to Upjohn). M. H. Peterson et al., *J. Am. Chem. Soc.* **77**, 5613 (1955). Structure: eidem, *ibid.* **82**, 1005 (1960); **83**, 3096 (1961). Stereochemistry: N. J. McCorkindale, J. G. Sime, *Proc. Chem. Soc.* **1961**, 331; J. R. Turner, D. S. Tarbell, *Proc. Nat. Acad. Sci. USA* **48**, 733 (1962). Biosynthesis: A. J. Birch, S. F. Hussain, *J. Chem. Soc. (C)* **1969**, 1473. Total synthesis: E. J. Corey, B. B. Snider, *J. Am. Chem. Soc.* **94**, 2549 (1972). Anti-amebic activity: M. C. McCowers et al., *Science* **113**, 202 (1951). Antineoplastic activity: J. A. DiPaolo et al., *Antibiotics Annual 1958-1959*, 541. Review: Girolami, "Fumagillin" in Kavanagh's *Anal. Microbiol.* (Academic Press, New York, 1963) pp 295-301; B. J. Wilson, "Miscellaneous *Aspergillus* Toxins" in *Microbial Toxins*, vol. VI, A. Ciegler et al., Eds. (Academic Press, New York, 1971) pp 277, 281.

Yellow needles from methanol, mp 194-195°. $[\alpha]_D^{25} -26.9^\circ$ ($c = 1$ in 95% ethanol). Absorptivity: 156.0 at 335 nm and 146.5 at 351 nm (soln of 100 mg in 10 ml chloroform diluted with alcohol to 0.0004% fumagillin and 0.04% chloroform). Practically insol in water, dil acids, satd hydrocarbons. Sol in most other organic solvents, in aq solns of bicarbonates and alkali hydroxides. Best stored in dark, evacuated ampuls at low temps. Stability data: T. E. Eble, E. R. Garrett, *J. Am. Pharm. Assoc.* **43**, 536 (1954); E. R. Garrett, *ibid.* **539**. LD₅₀ in mice (mg/kg): ~800 s.c. (DiPaolo).

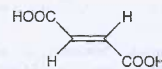


Methyl ester. $\text{C}_{27}\text{H}_{36}\text{O}_7$. Crystals from dil methanol, mp 147-150°.

THERAP CAT: Formerly used as antiamebic.

THERAP CAT (VET): Antiprotozoal. Control of *Nosema* spp in honey bees.

4308. Fumaric Acid. [110-17-8] (2*E*)-2-Butenedioic acid, *trans*-1,2-ethylenedicarboxylic acid; allomaleic acid; oleic acid. $\text{C}_4\text{H}_4\text{O}_4$; mol wt 116.07. C 41.39%, H 3.47%, O 55.14%. Occurs in many plants, e.g., in *Fumaria officinalis* L., *Fumariaceae*, in *Boletus scaber* Bull., *Boletaceae*, and in *Fomes fomentarius* (Fries) Kickx., *Polyporaceae*. Essential to vegetable and animal tissue respiration. Prep'd industrially from glucose by the action of fungi such as *Rhizopus nigricans*: Foster, Waldman, *J. Am. Chem. Soc.* **61**, 127 (1939). Laboratory prep'n by the oxidation of furfural with sodium chlorate in the presence of vanadium pentoxide: Milas, *Org. Syn. coll. vol. II*, 302 (1943). Molecular structure: J. L. Derissen, *J. Mol. Struct.* **8**, 177 (1977). Review: W. D. Robinson, R. A. Mount in *Kirk-Othmer Encyclopedia of Chemical Technology* vol. 14 (Wiley-Interscience, New York, 3rd ed., 1981) pp 770-793.



Monoclonic, prismatic needles or leaflets from water. d 1.425. Sublimes at 200°. Sublimes at 165° at 1.7 mm pressure. Partial carbonization and formation of maleic anhydride occur at 230° (open vessel). mp 287° (closed capillary, rapid heating); pk₁ (25°): 3.03; pk₂: 4.54. Absorption spectrum: Macbeth, *Spectro-*

