What is Safrole?
Safrole is a phenolic ether, also known as 5-(2-propenyl)-1,3-benzodioxole. It is isolated from the essential oil of both sassafras and camphor, and is an irritant and is toxic. Safrole is found in the greatest concentrations in the root bark of *Sassafras albidum* and in the trunk bark of *Camphra* spp. It is present, in minor concentrations, in some basil, bay laurel, cinnamon, cocoa, ginger, mace, nutmeg, pepper, star anise and tarragon. Oil of sassafras, produced by steam distillation, contains about 80% safrole.

At room temperature, safrole is clear to pale-yellow in color and smells like sassafras. It is practically insoluble in water, insoluble in glycerine and soluble in alcohol.

Since 1960, the use of oil of sassafras, sassafras bark and safrole in food, has been banned by the FDA. According to Steven Foster in *Forest Pharmacy—Medicinal Plants in American Forests*, “…in 1976 the FDA banned sassafras sold for use in herbal tea on the basis that a cup of hot water is “food” and sassafras root bark and/or leaves, which are used to flavor the water, are food additives.”

What Does the FDA Ban State?
CFR-Code of Regulations Title 21, Part 189 – Substances Prohibited from Direct Addition or Use as Human Food, Section 189.180 Safrole
(a) Safrole is the chemical 4-allyl-1, 2-methylenedioxy-benzene, C10H10O2. It is a natural constituent of the sassafras plant. Oil of sassafras is about 80 per cent safrole. Isosafrole and dihydrosafrole are derivatives of safrole, and have been used as flavoring compounds.
(b) Food containing any added safrole, oil of sassafras, isosafrole, or dihydrosafrole, as such, or food containing any safrole, oil of sassafras, isosafrole or dihydrosafrole, e.g., sassafras bark, which is intended solely or primarily as a vehicle for imparting such substances to another food, e.g., sassafras tea, is deemed to be adulterated in violation of the act based upon an order published in the Federal Register of December 3, 1960 (25 FR 12412).

How is Safrole Used?
The essential oil of sassafras, which contains safrole, was once used to flavor rootbeer. Safrole has been used to flavor medicine to improve palatability, and in perfume and soap as fragrance. It has been added to pesticides to enhance other, active, ingredients and to library paste and mucilage as a preservative. Safrole is used to flavor tobacco, especially *bidi* cigarettes. *Betel quid*, a chewable package of areca nuts, sometimes tobacco, sweeteners and spices, wrapped in a betel leaf that is coated with slacked lime contains safrole.

In recent times, safrole has also been used in the illicit production of the drug 3,4-methylenedioxymethamphetamine (MDMA, or ecstasy), and the U.S. Drug Enforcement Administration has designated safrole a List I Chemical (DEA 2004, 2009).
Why is Safrole Banned by the FDA?
Safrole, according to the Report on Carcinogens, Twelfth Edition (2011), is “reasonably anticipated to be a human carcinogen based on sufficient evidence of carcinogenicity from studies in experimental animals.” Simply put, rodents were fed food laced with, force-fed with a feeding tube and injected with safrole; all delivery systems resulted in various forms of liver cancer. In addition to liver cancer, sufficient doses cause kidney damage, genotoxicity, cell toxicity and oxidative stress.

Swiss Study of Safrole and Human Toxicology
In 1977, Swiss toxicologists administered small doses of safrole to volunteer human subjects to discover if the cancer-causing metabolite 1’-hydroxysafrole would be found in the urine. The humans did not produce the metabolite, unlike the mice in safrole studies. The Swiss study suggested that mice and humans metabolize safrole differently. The question of dosage remains. Unlike the mice, the people were given minute doses (a maximum of 1.655 mg).

References for Further Investigation


