Ginger oil

Botanical Source Zingiber officinale
Synonyms
IUPAC Name
CAS Reference 8007-08-7
E Number

Food Legislation

Council of Europe (CoE)	
Number	Comment
489	Listed by the Council of Europe as acceptable for use in food.

US Food and Drug Administration	
Number	Comment
182.20	Approved by the US FDA. FDA 21 CFR 182.20

Joint FAO/WHO Expert Committee on Food Additives (JECFA)		
Number	ADI	Comment
-	-	-

FEMA	
FEMA No.	Comment
2522	Generally recognised as safe as a flavour ingredient:GRAS List Number 3

Natural Occurrence and Use in Food
Found in ginger; used in candy, baked goods, meats.

Estimated Intake From Food and Drink	
Daily Intake mg/kg/day	FEMA Possible Average Daily
0.02627	6.154

Tobacco Legislation

Tobacco				
Country	Cigarettes	RYO	Cigars	Pipe
Afghanistan				
Algeria				
Argentina				
Australia				
Bahrain				
Brazil				
Burundi				
Canada				
Comoros				
Djibouti				
EEC				
Egypt				
Eritrea				
EU TPD2				
Fiji				
France	Y	Y	Y	Y
GCC (Bahrain,				
Germany	Y	Y	Y	Y
Hong Kong				
Hungary	Y	Y	Y	Y
Iceland				
Iran				
Iraq				
Jordan				
Kazakhstan				
Kuwait				
Latvia				
Libya				
Macedonia				
Madagascar				

Malaysia				
Maldives				
Mexico				
Moldova				
Montenegro				
New Zealand				
Nigeria				
Norway				
Pakistan				
Palestine				
Papua New Guinea				
Rwanda				
Samoa				
Saudi Arabia				
Serbia				
Solomon Island				
Somalia				
Somaliland				
South Sudan				
Sri Lanka				
Sweden				
Switzerland	Y	Y	Y	Y
Syria				
Tunisia				
Turkey				
UK	0.15	0.15	0.15	0.5
United Arab				
Uzbekistan				
Vietnam				

Y=Permitted for use in tobacco products. If use is limited, the maximum permitted level is given.

Tobacco Product related Chemical and Biological Studies

Smoke Chemistry		
Published Source	Level Tested %	Comment
Philip Morris	0.00010	An overall assessment of the data suggests that this ingredient did not add to the toxicity of smoke.
BAT	0.00700	At maximum application level this ingredient is not associated with significant increases in levels of Hoffmann analytes in smoke.

Ames Activity		
Published Source	Level Tested %	Comment
BAT	0.00700	Within the sensitivity and specificity of the system the Ames activity of the cigarette smoke condensate was not increased by the addition of the ingredient.
Philip Morris	0.00010	Within the sensitivity and specificity of the system the Ames activity of the cigarette smoke was not increased by the addition of the ingredient.

Micronucleus		
Published Source	Level Tested %	Comment
BAT	0.00700	Within the sensitivity of the in vitro micronucleus assay the activity of the cigarette smoke condensate was not increased by the addition of the ingredient.

Neutral red		
Published Source	Level Tested %	Comment
BAT	0.00700	Within the sensitivity of the test system the in vitro cytotoxicity of the cigarette smoke condensate was not increased by the addition of the ingredient.
Philip Morris	0.00010	Within the sensitivity of the test system the in vitro cytotoxicity of the cigarette smoke was not increased by the addition of the ingredient.

Inhalation		
Published Source	Level Tested %	Comment
BAT	0.00070	The results indicate that the addition of the ingredient had no discernible effect on the inhalation toxicity of mainstream smoke
Lorillard	0.00001	The results indicate that the addition of the ingredient had no discernible effect on the inhalation toxicity of mainstream smoke.
Philip Morris	0.00010	The data indicate that the addition of the ingredient, when added with one of three groups, did not increase the inhalation toxicity of the smoke.

Mouse Skin Painting		
Published Source	Level Tested %	Comment
Lorillard	0.00001	None of the changes appeared to be substantial enough to conclude that the tumour promotion capacity of the condensate was discernibly different between condensate produced from cigarettes with the ingredient in comparison with condensate from cigarettes without the ingredient.

Toxicological Data on the Unburnt Ingredient

[+ve positive; -ve, negative; ? equivocal

With, with metabolic activation; without, without metabolic activation]

In vitro

Test System	Test Conditions	Endpoint	Activation Status	Results	Reference
Chinese hamster lung cells	Cells incubated for 48 hours with up to 0.0625 mg/ml ginger oil without S9 and examined for chromosome aberrations	Chromosome damage	Without	-ve	Ishidate, 1988
Salmonella typhimurium, strains TA98, TA100, TA1535, TA1537 and TA1538	Bacterial reverse mutation (Ames) test with 2 µl/plate [1.74 mg/plate] ginger oil in the presence and absence of S9	Mutation.	With and without	-ve	Hachiya et al, 1985
Bacillus subtilis, strains M45 and H17.	Ginger oil tested in the rec assay "spore plate method" measuring differential killing (with and without S9).	DNA damage	With and without	+ve (without S9 only)	Kuroda et al, 1989
Bacillus subtilis, strains M45 and H17	5 µl/disc [4.36 mg/disc] Ginger oil tested in the rec assay measuring differential killing (with and without S9)	DNA damage	With and without	+ve (without S9 only)	Hachiya et al, 1985

In vivo

Test System	Test Conditions	Endpoint	Results	Reference
Human.	4% Ginger oil was applied in petrolatum in a 48-hour closed patch test.	Skin irritation.	No irritation.	Opdyke, 1974
Rabbit.	100% Ginger oil was applied to intact or abraded rabbit skin for 24 hours under occlusion.	Skin irritation.	Moderately irritating.	Opdyke, 1974
Mouse.	100% Ginger oil was applied to the backs of hairless mice.	Skin irritation.	Not irritating.	Opdyke, 1974
Human	25 volunteers tested with 4% “ginger oil” in petrolatum.	Skin sensitization	No sensitization	Opdyke, 1974
Rat.	Test substance was “ginger oil”. Dose not specified.	Mortality	LD_{50} >5000 mg/kg bw	Opdyke, 1974
Mouse, Swiss.	Males and females treated once orally with 0, 2000 and 7000 mg/kg bw “essential oil extract from the rhizomes of *Zingiber officinalis* Roscoe” prepared by being “hydrodistillated”. Controls received distilled water	Mortality	25% mortality at 7000 mg/kg bw.	Biapa et al, 2010
Rabbit	Test substance was “ginger oil”. Dose not specified.	Mortality	LD_{50} >5000 mg/kg bw	Opdyke, 1974
Rat, Wistar	0, 100, 250 or 500 mg/kg bw/day Ginger oil was administered to 5/sex/dose in paraffin oil by oral gavage, 6 days/week for 13 weeks. Controls either received vehicle only or were untreated	Mortality, clinical signs of toxicity, body weight, food intake, haematology, serum chemistry, necropsy examination, organ weights, histopathology	NOAEL 500 mg/kg bw/day (the highest dose tested). No adverse effects	Jeena et al, 2011

Test System	Test Conditions	Endpoint	Results	Reference
Rat, Wistar.	Males and females treated daily with 0, 600, 1000, 1400 and 1800 mg/kg bw/day “essential oil extract from the rhizomes of *Zingiber officinalis* Roscoe” prepared by being “hydrodistillated”. Controls received distilled water	Mortality, body weight, food and water intake, serum chemistry, blood cell count, liver histopathology.	In both sexes, a statistically significant reduction in body weight at 1000 mg/kg bw/day and above and a dose-dependent increase in alanine transaminase (ALAT), aspartate transaminase (ASAT) and creatinine (statistically significant at all doses) and serum protein (not statistically significant at the lowest dose). Liver effects (clarification of hepatocytes, congestion and necrosis) at the top two doses	Biapa et al, 2010
Mouse, Swiss	5 male albino mice were given 0, 0.625, 1.25 or 2.5 ml/kg bw [0.544, 1.089, 1.960 mg/kg bw] ginger oil as a single intraperitoneal injection and the bone marrow cells assessed for chromosome aberrations 18 hours later	Chromosome damage	Weak +ve. There was a dose-related increase in the mean incidence of aberrant cells, from 1.2% in controls, up to 6.8% at the top dose.	Mukhopadhyay and Mukherjee, 2000

References

Ishidate, M., Harnois, M.C., Sofuni, T., 1988

A comparative analysis of data on the clastogenicity of 951 chemical substances tested in mammalian cell cultures. *Mutation Res.*, 195, 151-213.

Hachiya, N., et al, 1985

Summary of the results of acute, chronic and mutagenicity tests of naturally occurring additives. 2.(1981-1983). *Tokishikoroji Foramu [Toxicology Forum]*, 8, 91-105.

Kuroda, K., Yoo, Y.S., Ishibashi, T., 1989

Rec-assay on natural food additives. *Seikatsu Eisei*, 33, 15-23.

Opdyke, D.L.J., 1974

Monographs on fragrance raw materials: Ginger oil. *Fd Cosmet. Toxicol.*, 12, 901-902.

Biapa Nya Prosper, C., Kuiate Jules, R., Wankeu Modeste, Ntiokam, D., 2010

Acute and subacute toxicity studies of *Zinginber Officinalis* Roscoe essential oil on mice (Swiss) and rats (Wistar). *Afr. J. Pharmac. Sci Pharm.*, 1(1), 39-49.

Jeena, K., Liju, V.B., Kuttan, R., 2011

A preliminary 13-week oral toxicity study of ginger oil in male and female Wistar rats. *Int. J. Toxic.*, 30, 662-670.

Mukhopadhyay, M.J. and Mukherjee, A., 2000

Clastogenic effect of ginger rhizome in mice. *Phytother. Res.*, 14, 555-557