

Geranyl acetate

Botanical Source

Synonyms	DIMETHYL-OCTA-2; 6-DIENYL ACETATE (3,7-)
IUPAC Name	3,7-DIMETHYLOCTA-2,6-DIENYL ACETATE
CAS Reference	105-87-3
E Number	

Food Legislation

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

US Food and Drug Administration	
Number	Comment
182.60	Approved by the US FDA. FDA 21 CFR 182.60

Joint FAO/WHO Expert Committee on Food Additives (JECFA)		
Number	ADI	Comment
58	580	ADI 0-0.5 mg/kg bw

FEMA	
FEMA No.	Comment
2509	Generally recognised as safe as a flavour ingredient:GRAS List Number 3

Natural Occurrence and Use in Food
Found in celery, cocoa, blackcurrants, chervil, gin, ginger, grape, grapefruit juice, orange juice, passion fruit, pineapple, plum; used in baked goods, ice cream, syrups.

Estimated Intake from Food and Drink	
Daily Intake mg/kg/day	FEMA Possible Average Daily Intake mg
0.003333	3.09

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Tobacco Product Related Chemical and Biological Studies for Ingredients Added in a Mixture

Smoke Chemistry		
Published Source	Level Tested %	Comment
BAT	0.00100	At maximum application level this ingredient is not associated with significant increases in levels of Hoffmann analytes in smoke.
Philip Morris	0.00020	An overall assessment of the data suggests that this ingredient did not add to the toxicity of smoke.

Ames Activity		
Published Source	Level Tested %	Comment
BAT	0.00100	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	0.00020	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	0.00100	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	0.00100	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	0.00020	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	0.00100	The results indicate that the addition of the ingredient had no discernible effect on the inhalation toxicity of mainstream smoke.
Philip Morris	0.00020	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

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Tobacco Product Related Chemical and Biological Studies for Ingredients Tested Single

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Toxicological Data on the Unburnt Ingredient

[+ve, positive; -ve, negative; ?, equivocal; with, with metabolic activation; without, without metabolic activation]

In vivo

Species	Test conditions	Endpoint	Result	Reference
Mouse (males; group sizes of 5 to 6)	Micronucleus test in bone marrow. Intraperitoneal injection of 0, 450, 900 or 1800 mg/kg bw/day for 3 days. Highest dose said to be the maximum tolerable. Animals killed 24 hours after final injection.	Chromosome damage	-ve a good quality study	Shelby et al., 1993.
Mouse (males; group sizes of at least 5)	Micronucleus test in bone marrow. 3 intraperitoneal injections 24 hours apart [dose not stated for compounds with negative results]. Animals killed 24 hours after final injection.	Chromosome damage	-ve	Shelby & Witt, 1995. [probably the same data as from the study above]
Mouse (males; group sizes of at least 8)	Chromosome aberration test in bone marrow. Single intraperitoneal injection [dose not stated for compounds with negative results]. Animals killed 17 or 36 hours after final injection.	Chromosome damage	-ve	Shelby & Witt, 1995.
Mouse (groups of 4)	Comet assay in 8 organs. Animals dosed orally at 2 g/kg bw and killed 3 or 24 hours after treatment. No overt toxicity was seen.	DNA damage	-ve a good quality study	Sasaki et al., 2000.

In vitro

Test system	Test conditions	Endpoint	Activation	Result	References
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<i>Human cells</i>					
Human TK6 cells	Concentrations up to 500 µg/ml. Treatment time 20 hours without S9; 3 hours with S9. Cells harvested 3 days after end of treatment.	Mutation	With and without S9	-ve a good quality study	Caspary et al., 1988.
<i>Other mammalian cells</i>					
Chinese hamster ovary (CHO) cells	Sister chromatid exchange tests. Concentrations up to 300 µg/ml. Treatment time 8-10 hours without S9; 2 hours with S9. Harvest time 8-10 hours after start of treatment.	Chromosome effects	With and without S9	? possibly weak +ve but no convincing evidence	Galloway et al., 1987.
Chinese hamster ovary (CHO) cells	Chromosome aberration tests. Concentrations up to 150 µg/ml. Treatment time 8-10 hours without S9; 2 hours with S9. Harvest time 8-10 hours after start of treatment.	Chromosome damage	With and without S9	-ve a good quality study	Galloway et al., 1987.
Mouse L5178Y cells	Mouse lymphoma test. [Details not given, publication is an abstract only.]	Mutation	Without	+ve	Mitchell, 1993.
Mouse L5178Y cells	Mouse lymphoma test. [Details not given, publication is an abstract only.]	Mutation	With and without S9	+ve	Heck et al., 1989.

Mouse L5178Y cells	Mouse lymphoma test. Concentration of 18 µg/ml for 4 hours. Cells harvested 2 days after end of treatment.	Mutation	With and without S9	+ve	Caspary et al., 1988.
Mouse L5178Y cells	Mouse lymphoma test. Concentrations up to 0.1 µg/ml for 4 hours. Cells harvested 2 days after end of treatment.	Mutation	With and without S9	+ve	Myhr & Caspary, 1991.
Mouse L5178Y cells	Mouse lymphoma test at 3 loci. Test concentration not given. Treatment time 4 hours. Cells harvested 48 hours (TK and Na ⁺ /K ⁺ ATPase loci) or 144 hours (HGPRT locus) after end of treatment.	Mutation	With and without S9	-ve	Back et al., 1987
Syrian hamster embryo (SHE) cells	Transformation assay at up to 4 mg/ml. Treatment time 3-7 days. Harvest time 7 days from start of treatment. [a positive result in this assay might be indicative of tumour promoting potential]	Cell transformation	N/A	+ve	Jones et al., 1988.

Chinese hamster ovary (CHO) cells	HGPRT assay. Test concentration and harvest time not given, publication is an abstract only. 3 hour treatment time.	Mutation	With and without S9	-ve	Flowers & Li, 1988.
Chinese hamster ovary (CHO) cells	HPRT assay. Details not given, publication is only an abstract.	Mutation	With and without S9	-ve	Stankowski et al., 1988.
Rat hepatocytes	Alkaline elution/rat hepatocyte assay. Concentrations up to 0.3 mM [59 µg/ml]. Cells treated for 3 hours.	DNA damage	without S9	+ve at 0.25 mM [49 µg/ml]	Storer et al., 1996.
Rat hepatocytes	Unscheduled DNA synthesis (UDS) assay. Details not given, publication is just an abstract.	Unscheduled DNA synthesis	Not applicable	-ve	Mirsalis et al., 1983.
<u>Bacteria</u>					
<i>Salmonella typhimurium</i> TA98, TA100, TA1535, TA1537	Ames test. Concentrations up to 3.3 mg/plate.	Mutation	With and without S9	-ve a good quality study	Mortelmans et al., 1986.
<i>Salmonella typhimurium</i> TA98, TA100, TA1535, TA1537, TA1538	Ames test. No details given, published only as an abstract.	Mutation	With and without S9	-ve	Heck et al., 1989.

<i>Escherichia coli</i> WP2s (λ)	Prophage inhibition capacity. Bacteria treated at 25 μ g/well [100 μ g/ml].	Mutation	With and without S9	+ve (with S9)	Rossman et al., 1991.
<i>Bacillus subtilis</i> H17 and M45	Rec-assay (measuring differential toxicity) at 20 μ l/disc. This dose was not toxic to the bacteria.	DNA damage (indicative test)	Without S9	No result (reported as -ve by the investigator, but the study type relies on achieving toxicity in the wild strain)	Yoo, 1986.
<i>Bacillus subtilis</i> H17 and M45	Rec-assay at 17 μ g/disc. This dose was mildly toxic to the bacteria.	DNA damage (indicative test)	Without S9	-ve	Oda et al., 1978.

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