Coffee extract

Botanical Source	Coffea spp; Coffea Arabica; Coffea canephora; Coffea robusta
Synonyms	
IUPAC Name	
CAS Reference	93348-12-0 68916-18-7 84650-00-0 8001-67-0
E Number	

Food Legislation

Council of Europe (CoE)	
Number	Comment
148	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
	Generally recognised as safe as a flavour ingredient:GRAS List Number 3

Natural Occurrence and Use in Food
Found in coffee; used in baked goods, candy, syrups.

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

-	-

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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	0.27000	At maximum application level this ingredient is not associated with significant increases in levels of Hoffmann analytes in smoke.
Philip Morris	0.00950	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	0.27000	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	0.00950	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	0.27000	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	0.27000	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	0.00950	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	0.27000	The results indicate that the addition of the ingredient had no discernible effect on the inhalation toxicity of mainstream smoke.
Lorillard	0.00750	The results indicate that the addition of the ingredient had no discernible effect on the inhalation toxicity of mainstream smoke.
Philip Morris	0.00950	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	0.00750	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.

References

Baker RR, Pereira da Silva JR, Smith G. The effect of tobacco ingredients on smoke chemistry. Part I: Flavourings and additives. Food Chem Toxicol. 2004; 42 Suppl:S3-37.

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Carmines EL. Evaluation of the potential effects of ingredients added to cigarettes. Part 1: cigarette design, testing approach, and review of results. Food Chem Toxicol. 2002; 40(1): 77-91.

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Roemer E, Tewes FJ, Meisgen TJ, Veltel DJ, Carmines EL. Evaluation of the potential effects of ingredients added to cigarettes. Part 3: in vitro genotoxicity and cytotoxicity. Food Chem Toxicol. 2002; 40(1): 105-111.

Vanscheeuwijck PM, Teredesai A, Terpstra PM, Verbeeck J, Kuhl P, Gerstenberg B,

Gebel S, Carmines EL. Evaluation of the potential effects of ingredients added to cigarettes. Part 4: subchronic inhalation toxicity. Food Chem Toxicol. 2002; 40(1): 113-131.

Gaworski CL, Dozier MM, Heck JD, Gerhart JM, Rajendran N, David RM. Brennecke LH, Morrissey R. Toxicologic evaluation of flavor ingredients added to cigarette tobacco: 13 week inhalation exposures in rats. Inhal. Toxicol. 1998; 10:357-381

Gaworski CL, Heck JD, Bennett MB, Wenk ML. Toxicologic evaluation of flavor ingredients added to cigarette tobacco: skin painting bioassay of cigarette smoke condensate in SENCAR mice. Toxicology. 1999; 139(1-2):1-17.

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Tobacco Product Related Chemical and Biological Studies for Ingredients Tested Singly

References
Baker RR, Bishop LJ. The pyrolysis of non-volatile tobacco ingredients using a system that simulates cigarette combustion conditions. J. Anal. Appl. Pyrolysis 2005, 74, 145-170.

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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

Test system	Test conditions	Summary of Results	References
Humans, other mammals	IARC reviewed the *in vivo* genotoxicity of coffee in their 1991 assessment of carcinogenicity	Otherwise healthy splenectomized coffee drinkers, some of whom occasionally drank tea, had an increased frequency of micronuclei in both reticulocytes and mature erythrocytes. Instant coffee did not induce micronuclei (chromosome damage) or sister chromatid exchange in the bone-marrow cells of rodents. Coffee reduced the genotoxic activity of several model mutagens *in vivo*.	IARC, 1991
		No significant new data on *in vivo* genotoxicity were presented in more recent reviews.	Nehlig & Debry, 1994 & 1996

In vitro

Test system	Test conditions	Summary of Results	References
Mammalian and bacterial cells, and insects (the last could also be described as *in vivo*)	IARC reviewed the *in vitro* genotoxicity of coffee in their 1991 assessment of carcinogenicity	The urine of coffee drinkers was not mutagenic to bacteria but induced chromosomal aberrations in cultured mammalian cells. Brewed coffee induced chromosomal aberrations and sister chromatid exchange in cultured human lymphocytes. Sister chromatid exchange was also induced in cultured mammalian cells. In insects, negative results for both brewed and instant coffee were obtained for aneuploidy, chromosomal aberrations, dominant lethal effects and sex-linked recessive lethal mutation; brewed and instant coffee gave weakly positive results in assays for somatic cell mutation and mitotic recombination. In bacteria, brewed, instant and decaffeinated coffee were mutagenic (particularly to strains with enhanced sensitivity to oxidative mutagens) and induced DNA damage. Instant coffee induced chromosomal aberrations in cultured human lymphoctyes and induced mutations and sister chromatid exchange in cultured mammalian cells; it was not mutagenic in host-mediated bacterial mutagenic assays. Decaffeinated coffee induced chromosomal aberrations in cultured human lymphocytes and sister chromatid exchange in cultured mammalian cells. It gave negative results in assays for somatic cell mutation and mitotic recombination assays in insects. Coffee reduced the genotoxic activity of several model mutagens *in vitro*.	IARC, 1991

		No significant new data on *in vitro* genotoxicity were presented in more recent reviews.			Nehlig & Debry, 1994 & 1996
Salmonella typhimurium TA98, YG1024, YG1029	Two instant coffee products were tested in an Ames assay using standard plate incorporation with five (unspecified) concentrations.	Mutation	With S9 without	+ve -ve	Johansson et al. 1995

References

IARC (1991). Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans. Volume 51. Coffee, tea, mate, methylxanthines and methylglyoxal. p 41-206. International Agency for Research on Cancer, Lyon.

Johansson MAE *et al* (1995). Characterization of mutagenic activity in instant hot beverage powders. Environmental and Molecular Mutagenesis, 25, 154.

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