Methyl butyraldehyde (3-)

Botanical Source

Synonyms ISOPENTALDEHYDE;
ISOPENTANAL;
METHYL BUTANAL (3-);
ISOVALERALDEHYDE;
ISOVALERIC ALDEHYDE;
3-methylbutyraldehyde;
Methyl butyraldehyde

IUPAC Name

CAS Reference 590-86-3

E Number

Food Legislation

Council of Europe (CoE)	
Number	Comment
94	Listed by the Council of Europe as acceptable for use in food at up to 3 ppm.

US Food and Drug Administration	
Number	Comment
172.515	Approved by the US FDA. FDA 21 CFR 172.515

Joint FAO/WHO Expert Committee on Food Additives (JECFA)		
Number	ADI	Comment
258	110	No safety concern at current levels of intake when used as a flavouring agent.

FEMA	
FEMA No.	Comment
2692	Generally recognised as safe as a flavour ingredient:GRAS List Number 4

Natural Occurrence and Use in Food
Found in apple, banana, bread, tomato, rice, blackberry; used in baked goods.

Estimated Intake from Food and Drink	
Daily Intake mg/kg/day	FEMA Possible Average Daily Intake mg
0.002217	3.516

Methyl butyraldehyde (3-)

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

Smoke Chemistry		
Published Source	Level Tested %	Comment
BAT	0.00400	At maximum application level this ingredient is not associated with significant increases in levels of Hoffmann analytes in smoke.
Philip Morris	0.00570	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	0.00400	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	0.00570	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	0.00400	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	0.00400	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	0.00570	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	0.00400	The results indicate that the addition of the ingredient had no discernible effect on the inhalation toxicity of mainstream smoke.
Lorillard	0.00030	The results indicate that the addition of the ingredient had no discernible effect on the inhalation toxicity of mainstream smoke.
Philip Morris	0.00570	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	0.00005	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.

Baker RR, Pereira da Silva JR, Smith G. The effect of tobacco ingredients on smoke chemistry. Part II: casing ingredients. Food Chem Toxicol. 2004; 42 Suppl:S39-52.

Baker RR, Massey ED, Smith G. An overview of the effects of tobacco ingredients on smoke chemistry and toxicity. Food Chem Toxicol. 2004; 42 Suppl:S53-83.

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.

Rustemeier K, Stabbert R, Haussmann HJ, Roemer E, Carmines EL. Evaluation of the potential effects of ingredients added to cigarettes. Part 2: chemical composition of mainstream smoke. Food Chem Toxicol. 2002; 40(1): 93-104.

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.

Methyl butyraldehyde (3-)

Tobacco Product Related Chemical and Biological Studies for Ingredients Tested Singly

References
Baker RR, Bishop LJ. The pyrolysis of tobacco ingredients. J. Anal. Appl. Pyrolysis 2004, 71, 223-311.

Methyl butyraldehyde (3-)

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	Administered at up to 100 mg/kg bw by i.p. injection. Examination of micronucleus formation. [No further details given in this brief review.]	Chromosome damage	-ve	SIAP, 2000 [citing a single unidentified report, not featuring in the IUCLID record]

In vitro

Test system	**Test conditions**	**Endpoint**	**Activation**	**Result**	**References**
Human lymphocytes	Tested at 0.002-0.003% [up to about 30 mg/l]. Cells exposed for 24-48 hr and examined for evidence of sister chromatid exchange (SCE).	Chromosome effects	Without	? -ve reported by the investigators, SCE incidence was higher (about 2x) in 1/3 experiments.	Obe & Beek, 1979
Salmonella typhimurium TA98, TA100, TA102	Ames test up to 86 µg/plate. Current guidelines recommend the use of 5 strains with concentrations up to 5 mg/plate.	Mutation	With and without S9	-ve (limited study)	Aeschbacher *et al.* 1989

Salmonella typhimurium TA98, TA100, TA1535, TA1537	Ames, up to 3 μmol/plate [0.26 mg/plate] in a spot test.	Mutation	With and without S9	-ve (a spot test is a limited assay)	Florin *et al.* 1980
Bacillus subtilis M45 and H17	3-methyl butyraldehyde was tested at 1.03-1.99 mg/ml in a rec assay measuring differential killing.	DNA damage (indicative test)	With and without S9	-ve	Matsui *et al.* 1989

References

Aeschbacher H U *et al* (1989). Contribution of coffee aroma constituents to the mutagenicity of coffee. Food and Chemical Toxicology, 27, 227-232.

Florin I *et al* (1980). Screening of tobacco smoke constituents for mutagenicity using the Ames test. Toxicology, 15, 219-232.

Matsui S *et al* (1989). The *Bacillus subtilis*/microsome rec-assay for the detection of DNA damaging substances which may occur in chlorinated and ozonated waters. Water Science and Technology, 21, 875-887.

Obe G & Beek B (1979). Mutagenic activity of aldehydes. Drug and Alcohol Dependence, 4, 91-94.

SIAP (2000). SIDS Initial Assessment Profile on 3-methylbutanal, available from OECD on the internet.