

Corn syrup, high fructose

Botanical Source

Synonyms

IUPAC Name

CAS Reference 8029-43-4,8052-08-2

E Number

Food Legislation

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

US Food and Drug Administration	
Number	Comment
168.120182.18	Generally recognised as safe as a flavour ingredient: GRAS List Number 3

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

FEMA	
FEMA No.	Comment

Natural Occurrence and Use in Food
Found in food sugar sources; used in baked goods, candy, cereals.

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

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

Smoke Chemistry		
Published Source	Level Tested %	Comment
BAT	6.20000	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
Philip Morris	6.25070	Within the sensitivity and specificity of the system the Ames activity of the cigarette smoke was not increased by the addition of the ingredient.
BAT	6.20000	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.

Micronucleus		
Published Source	Level Tested %	Comment
BAT	6.20000	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
Philip Morris	6.25070	Within the sensitivity of the test system the in vitro cytotoxicity of the cigarette smoke was not increased by the addition of the ingredient.
BAT	6.20000	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.

Inhalation		
Published Source	Level Tested %	Comment
Philip Morris	6.25070	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.
BAT	6.20000	The results indicate that the addition of the ingredient had no discernible effect on the inhalation toxicity of mainstream smoke.

Mouse Skin Painting		
Published Source	Level Tested %	Comment

References

Baker, R.R., Da Silva, J.R.P., Smith, G., 2004b. The effect of tobacco ingredients on smoke chemistry. Part 2: Casing ingredients. *Food and Chemical Toxicology*, 42S, S39-S52.

Baker, R.R., Massey, E.D., Smith, G., 2004c. An overview of the effects of tobacco ingredients on smoke chemistry and toxicity. *Food and Chemical Toxicology*, 42S, S53-S83.

Coggins, C.R.E., Wagner, K.A., Werley, M., Oldham, M.J., 2011. A comprehensive evaluation of the toxicology of cigarette ingredients: carbohydrates and natural products. *Inhalation Toxicology*, 23 (S1), 13-40.

Gaworski, C.L., Oldham, M.J., Wagner, K.A., Coggins, C.R.E., Patskan, G.J., 2011. An evaluation of the toxicity of 95 ingredients added individually to experimental cigarettes: approach and methods. *Inhalation Toxicology*, 23 (S1), 1-12.

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.

Toxicological Data on the Unburnt Ingredient

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

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

Human Studies

Test Conditions	Endpoint	Results	Reference
Not specified	Obesity	Possible role in obesity	Bray et al, 2004
Not specified – ecological study	Diabetes prevalence	Correlation between the prevalence of type 2 diabetes and the consumption of refined carbohydrates in the US	Gross et al, 2004
Not specified – ecological study	Oesophageal cancer	Correlation of oesophageal cancer to percentage of calories from corn syrup	Thompson et al, 2008

In vivo

Species	Test Conditions	Endpoint	Results	Reference
Rats, Sprague-Dawley	Oral dosing at 0 or 13% (approx. 18,600 mg/kg bw/day) in drinking water for 8 weeks	Effect on gonads and oestrous cycle (Reproductive and Developmental)	Gonadal fat pad weight was significantly increased in the treated compared with the control rats ($p<0.05$) and gonadal leptin mRNA levels were also significantly elevated ($p<0.05$). Oestrous cycle was found to be significantly longer in the exposed compared with the control rats ($p<0.05$), lengthened oestrus cycles being due to prolonged time in the oestrus phase ($p<0.05$). No significant differences were noted in uterine and ovarian weights or in serum oestradiol and testosterone.	Light et al 2009

In vitro

Test System	Test Conditions	Endpoint	Activation Status	Results	Reference
<i>Salmonella typhimurium</i> , strains TA98, TA100, TA1535, TA1537 and <i>Escherichia coli</i> , strain WP3uvrA	Ames assay up to 5mg/plate	Mutation	With and without S9	-ve	Kishimoto et al, 2001

References

Baker, R.R., Da Silva, J.R.P., Smith, G., 2004a. The effect of tobacco ingredients on smoke chemistry. Part 1: Flavourings and additives. *Food and Chemical Toxicology*, 42S, S3-S37.

Baker, R.R., Da Silva, J.R.P., Smith, G., 2004b. The effect of tobacco ingredients on smoke chemistry. Part 2: Casing ingredients. *Food and Chemical Toxicology*, 42S, S39-S52.

Baker, R.R., Massey, E.D., Smith, G., 2004c. An overview of the effects of tobacco ingredients on smoke chemistry and toxicity. *Food and Chemical Toxicology*, 42S, S53-S83.

Bray, G.A., Nielsen, S.J., Popkin, B.M., 2004. Consumption of high-fructose corn syrup in beverages may play a role in the epidemic of obesity. *Am. J. clin. Nutr.*, 79, 537-543.

Coggins, C.R.E., Wagner, K.A., Werley, M., Oldham, M.J., 2011. A comprehensive evaluation of the toxicology of cigarette ingredients: carbohydrates and natural products. *Inhalation Toxicology*, 23 (S1), 13-40.

Gaworski, C.L., Oldham, M.J., Wagner, K.A., Coggins, C.R.E., Patskan, G.J., 2011. An evaluation of the toxicity of 95 ingredients added individually to experimental cigarettes: approach and methods. *Inhalation Toxicology*, 23 (S1), 1-12.

Gross, L.S., Li, L., Ford, E.S., Liu, S., 2004. Increased consumption of refined carbohydrates and the epidemic of type 2 diabetes in the United States: an ecologic assessment. *Am. J. clin. Nutr.*, 79, 774-779.

Kishimoto, Y., Wakabayashi, S., Matsuda, I., Fudaba, H., Ohkuma, K., 2001. Acute toxicity and mutagenicity study on branched corn syrup and evaluation of its laxative effect in humans. *J. nutr. Sci. Vitaminol.*, 47, 126-131.

Light, H.R., Tsanzi, E., Gigliotti, J., Morgan, K., Tou, J.C., 2009. The type of caloric sweetener added to water influences weight gain, fat mass, and reproduction in growing Sprague-Dawley female rats. *Exp. Biol. Med.*, 234, 651-661.

Thompson, C.L., Khiani, V., Chak, A., Berger, N.A., Li, L., 2008. Carbohydrate consumption and esophageal cancer: an ecological assessment. *Am. J. Gastroent.*, N.Y., 103, 555-561.