

**Evaluation of
Delta-octalactone
For Use as a Cigarette Ingredient**

June 2005

INTRODUCTION

Delta-octalactone (CAS # 698-76-0) is currently used worldwide at levels below **1 ppm** in selected cigarette brands manufactured and/or distributed by Philip Morris International. This document is a review of current published toxicology information on delta-octalactone abstracted from online toxicity databases.

TOXICITY DATA ON UN-BURNED MATERIAL

The following information was generated from the MICROMEDEX database tool <http://csi.micromedex.com> on June 6th 2005, unless otherwise indicated.

Overview

Delta-octalactone naturally occurs in pineapple, papaya fruits, in coconut endosperm and in lemon balm. It is reported to have a "sweet, creamy, fatty with tropical and dairy nuances" odour. It is used in Coconut, Hazelnut, Butter, Cream, Milk, Cheese, Fruit (e.g., Apricot, Peach, Cranberry, Mango, Papaya, Pineapple, Raspberry, Strawberry) and Coumarin substitutes. Normal use levels in finished consumer products: 0.1-20 ppm.¹

As a food flavouring additive, the material has been assessed under the provisions of the *Federal Food, Drug and Cosmetic Act, section 201 (s)*, by the Expert Committee of the USA Flavour and Extract manufacturers' Association (FEMA), to be generally recognized as safe (GRAS) under current conditions of use (3214).

The Joint FAO/WHO Expert Committee on Food Additives has assessed delta-octalactone as presenting no safety concern at current levels of intake when used as a flavouring agent (JECFA 3214; COE 2195). It has been defined as a flavouring substance which may be used as foodstuffs by the *Council of Europe Committee of Experts on Flavouring Substances* at an upper level of 30 ppm.

As a fragrance in cosmetic preparations, the EU Scientific Committee on Cosmetics and Non-Food Products has evaluated delta-octalactone to be safe in present practices of use and concentration in cosmetics.

This material appears on the list of "Permitted Additives to Tobacco Products in the United Kingdom" (Department of Health, 2002) at a maximum level permitted for inclusion in cigarettes of 0.001% w/w tobacco.

The following information was generated from the RTECS – Registry of Toxic Effects of Chemical Substances, a database of MICROMEDEX Systems (<http://csi.micromedex.com>), June 6th 2005.

Health hazard data

Acute toxicity

LD50/LC50 - LETHAL DOSE/CONC 50% KILL

Rat

LD50 - ROUTE: Oral; DOSE: >5 gm/kg [Food and Chemical Toxicology. (Pergamon Press Inc., Maxwell House, Fairview Park, Elmsford, NY 10523) V.20- 1982- (20,783,1980)]

Rabbit

¹ Leffingwell and Associates. Flavor-base 98. Tobacco Edition. 1998

LD50 - ROUTE: Skin; DOSE: >5 gm/kg [Food and Chemical Toxicology. (Pergamon Press Inc., Maxwell House, Fairview Park, Elmsford, NY 10523) V.20- 1982- (20,783,1980)]

Irritation

SKIN - STANDARD DRAIZE TEST

Rabbit

ROUTE: Skin; DOSE: 500 mg/24H; REACTION: Moderate [Food and Chemical Toxicology. (Pergamon Press Inc., Maxwell House, Fairview Park, Elmsford, NY 10523) V.20- 1982- (20,783,1980)]

TOXICITY DATA ON BURNT MATERIAL

Data on the toxicity of delta-octalactone as a cigarette ingredient has been evaluated in a series of studies. The results of these studies may be found in the following references:

R.R. Baker et al., 2004, "An overview of the effects of tobacco ingredients on smoke chemistry and toxicity", Food and chemical toxicology, 42S:53-83. **PEER REVIEWED**

E.L. Carmines, 2002, "Evaluation of the Potential Effects of Ingredients Added to Cigarettes. Part I: Cigarette Design, Testing Approach and Review of Results," Food and Chemical Toxicology, 40:77-91. **PEER REVIEWED**

K. Rustemeier et al, 2002, "Evaluation of the Potential Effects of Ingredients Added to Cigarettes Part II. Chemical Smoke Composition," Food and Chemical Toxicology, 40:93 - 104. **PEER REVIEWED**

Roemer et al, 2002, "Evaluation of the Potential Effects of Flavor Ingredients Added to Cigarettes. Part 3. In Vitro Genotoxicity and Cytotoxicity," Food and Chemical Toxicology, 40:105-111. **PEER REVIEWED**

P.M. Vanscheeuwijck et al, 2002, "Toxicological Evaluation of Cigarettes without and with the Addition of Flavor Ingredients to the Tobacco. Part 4. Subchronic Inhalation Toxicity," Food and Chemical Toxicology, 40:113-131. **PEER REVIEWED**

These studies indicate that ingredients used in the production of cigarettes do not increase the overall toxicity of cigarette smoke.

CONCLUSION

Cigarette smoking causes lung cancer, heart disease, emphysema and other serious diseases in smokers. Smokers are far more likely to develop diseases, like lung cancer, than non-smokers. There is no 'safe' cigarette. Government health warnings about smoking apply to all cigarettes, regardless of the ingredients added, including those containing only tobacco and paper.

While Philip Morris International has not conducted human studies on the health effects of ingredients used in cigarette manufacture, studies have been conducted using scientifically accepted *in vitro* and *in vivo* toxicity assays with various ingredient mixtures (see Toxicity Data on Burnt Material above). These studies show there is no meaningful difference in the composition or toxicity of smoke when the smoke from cigarettes with added ingredients is compared to the smoke from cigarettes without added ingredients. These findings are supported by similar studies from the published literature. It is our scientific judgement, based on the best available data, that delta-octalactone used in our cigarettes does not increase the overall toxicity of cigarette smoke.