

**Evaluation of
Butyl isovalerate
for Use as a Cigarette Ingredient**

November 2005

INTRODUCTION

Butyl isovalerate (CAS # 109-19-3) 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 butyl isovalerate 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 November 1st 2005, unless otherwise indicated.

Overview

Butyl isovalerate, an ester of 1-butanol is reported to be found in the oil from leaves of *Eriostemon coxii* and *Phebalium dentatum*. It is described as having a sweet apple-like taste.

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 manufacturer's Association (FEMA), to be generally recognized as safe (GRAS) under current conditions of use.

The Joint FAO/WHO Expert Committee on Food Additives has assessed butyl isovalerate as presenting no safety concerns at current levels of intake when used as a flavouring agent¹. It has also 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 50 mg/kg in foods.

Butyl isovalerate is a common cosmetic ingredient.

The following information was generated from the RTECS – Registry of Toxic Effects of Chemical Substances, a database of MICROMEDEX Systems (<http://csi.micromedex.com>) on November 1st 2005.

Health hazard data

Acute toxicity

LD50/LC50 - LETHAL DOSE/CONC 50% KILL

Rat

LD50 - ROUTE: Oral; DOSE: >5 gm/kg [Food and Cosmetics Toxicology. (London, UK) V.1-19, 1963-81. For publisher information, see FCTOD7. (18,659,1980)]

¹ Safety evaluations of certain food additives and contaminants, WHO Food Additive Series 40, the Forty-ninth meeting of the Joint FAO/WHO Expert Committee on Food Additives (JECFA), 1998.
<http://www.inchem.org/documents/jecfa/jecmono/v040je17.htm>

Rabbit

LD50 - ROUTE: Oral; DOSE: 8230 mg/kg [Industrial Medicine and Surgery. (Northbrook, IL) V.18-42, 1949-73. For publisher information, see IOHSA5. (41,31,1972)]

TOXIC EFFECTS:

Sense Organs and Special Senses (Nose, Eye, Ear, and Taste) - Corneal damage

Cardiac - Pulse rate

Lung, Thorax, or Respiration - Dyspnea

LD50 - ROUTE: Skin; DOSE: >5 gm/kg [Food and Cosmetics Toxicology. (London, UK) V.1-19, 1963-81. For publisher information, see FCTOD7. (18,659,1980)]

Irritation

SKIN - STANDARD DRAIZE TEST

Rabbit

ROUTE: Skin; DOSE: 500 mg/24H; REACTION: Mild [Food and Cosmetics Toxicology. (London, UK) V.1-19, 1963-81. For publisher information, see FCTOD7. (18,659,1980)]

TOXICITY DATA ON BURNT MATERIAL

Data on the toxicity of butyl isovalerate after combustion 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 chemicals used in the production of cigarettes do not increase the overall toxicity of cigarette smoke.

DATA ON THE EFFECTS ON HUMAN HEALTH

The following information was generated from the HSDB – Hazardous Substances Data Bank, a database of MICROMEDEX Systems (<http://csi.micromedex.com>) on November 1st 2005.

Human Toxicity Excerpts

Except for n-butyl formate, all the simple esters of 1-butanol /incl butyl isovalerate/ ... are less acutely toxic than the parent alcohols. [**QC REVIEWED**] [Gosselin, R.E., R.P. Smith, H.C. Hodge. Clinical Toxicology of Commercial Products. 5th ed. Baltimore: Williams and Wilkins, 1984., p. II-201]

CONCLUSION

Cigarette smoking causes lung cancer, heart disease, emphysema and other serious diseases in smokers. Smokers are far more likely to develop serious 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 judgment, based on the best available data, that butyl isovalerate used in our cigarettes does not increase the overall toxicity of cigarette smoke.