Food and Chemical Toxicology 50 (2012) S209–S214

Contents lists available at SciVerse ScienceDirect

Food and Chemical Toxicology

journal homepage: www.elsevier.com/locate/foodchemtox

Review

Fragrance material review on 2-methyl-4-phenylpentanol

J. Scognamiglio [a,*], L. Jones [b], C.S. Letizia [a], A.M. Api [a]

[a] Research Institute for Fragrance Materials, Inc., 50 Tice Boulevard, Woodcliff Lake, NJ 07677, USA
[b] Leah Jones Consulting, 55 W 14th Street, New York, NY 10011, USA

ARTICLE INFO

Article history:
Available online 19 October 2011

Keywords:
Fragrance material
2-Methyl-4-phenylpentanol
Review

ABSTRACT

A toxicologic and dermatologic review of 2-methyl-4-phenylpentanol when used as a fragrance ingredient is presented. 2-Methyl-4-phenylpentanol is a member of the fragrance structural group Aryl Alkyl Alcohols and is a primary alcohol. The AAAs are a structurally diverse class of fragrance ingredients that includes primary, secondary, and tertiary alkyl alcohols covalently bonded to an aryl (Ar) group, which may be either a substituted or unsubstituted benzene ring. The common structural element for the AAA fragrance ingredients is an alcohol group –C–(R1)(R2)OH and generically the AAAs fragrances can be represented as an Ar–C–(R1)(R2)OH or Ar–Alkyl–C–(R1)(R2)OH group. This review contains a detailed summary of all available toxicology and dermatology papers that are related to this individual fragrance ingredient and is not intended as a stand-alone document. Available data for 2-methyl-4-phenylpentanol were evaluated then summarized and includes physical properties, acute toxicity, skin irritation, mucous membrane (eye) irritation, skin sensitization, repeated dose, and genotoxicity data. A safety assessment of the entire Aryl Alkyl Alcohols will be published simultaneously with this document; please refer to Belsito et al. (2012) for an overall assessment of the safe use of this material and all Aryl Alkyl Alcohols in fragrances.

Contents

* Corresponding author. Tel.: +1 201 689 8089; fax: +1 201 689 8090.
E-mail address: jscognamiglio@rifm.org (J. Scognamiglio).

0278-6915/$ - see front matter © 2011 Elsevier Ltd. All rights reserved.
doi:10.1016/j.fct.2011.10.025

1. Introduction

This document provides a comprehensive summary of the human health toxicological data currently available pertaining to the safety evaluation of 2-methyl-4-phenylpentanol (see Fig. 1) when used as a fragrance ingredient. All safety data on 2-methyl-4-phenylpentanol were compiled with due diligence including published and unpublished data. In 2009, a complete literature search was conducted on 2-methyl-4-phenylpentanol. On-line toxicological databases were searched including those from the Chemical Abstract Services, [e.g. ToxCenter (which in itself contains 18 databases including Chemical Abstracts)], and the National Library of Medicine [e.g. Medline, Toxnet (which contains 14 databases)] as well as 26 additional sources (e.g. BIOSIS, Embase, RTECS, OSHA, ESIS). In addition, all RIFM sponsored studies and studies from fragrance companies are included in this summary.

Data from all relevant references are summarized in this FMR. More details have been provided for unpublished data. The number of animals, sex, and strain are always provided unless they are not given in the original report or paper.

2. Identification

2.1 Synonyms: Benzenebutanol, β,δ-dimethyl-; Pamplefleur.
2.2 CAS Registry No.: 92585-24-5.
2.3 EINECS No.: 402-770-7.
2.4 Formula: $C_{12}H_{18}O$.
2.5 Molecular weight: 178.75.

3. Physical properties

3.1 Boiling point: 273.72 °C.
3.2 Flash point (measured): >3873 K.
3.3 Henry's law (calculated): 0.0000008964 atm m^3/mol 25 °C.
3.4 LogK_{ow} (calculated): 3.38.
3.5 Specific gravity: 0.99.
3.6 Vapor pressure (measured): 0.00227 mm Hg at 25 °C.
3.7 Water solubility (measured): 801 mg/l at 20 °C.
3.8 UV Spectra: Peaks at 200–210 nm and returns to baseline at 220 nm (spectrum available in RIFM database).

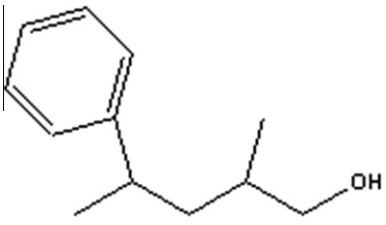

Fig. 1. 2-Methyl-4-phenylpentanol.

4. Usage

2-Methyl-4-phenylpentanol is a fragrance ingredient used in many compounds. It may be found in fragrances used in decorative cosmetics, fine fragrances, shampoos, toilet soaps, and other toiletries as well as in non-cosmetic products such as household cleaners and detergents. The worldwide volume of use for 2-methyl-4-phenylpentanol is in the region of 1–10 metric tons per year (IFRA, 2008). This reported volume is for its use as a fragrance ingredient in fragrance compounds (mixtures) found in all finished consumer product categories. The volume of use is surveyed by IFRA approximately every 4 years through a comprehensive survey of IFRA and RIFM member companies. As such the volume of use data from this survey provide volume of use of fragrance ingredients for the majority of the fragrance industry.

4.1. Exposure assessment

The dermal systemic exposure in cosmetic products (see Table 1) is calculated based on the concentrations of the same fragrance ingredient in ten types of the most frequently used personal care and cosmetic products (anti-perspirant, bath products, body lotion, eau de toilette, face cream, fragrance cream, hair spray, shampoo, shower gel, and toilet soap). The concentration of the fragrance ingredient in fine fragrances is obtained from examination of several thousand commercial formulations and the upper 97.5 percentile concentration is calculated from the data obtained. This upper 97.5 percentile concentration is then used for all 10 consumer products. These concentrations are multiplied by the amount of product applied, the number of applications per day for each product type, and a "retention factor" (ranging from 0.001 to 1.0) to account for the length of time a product may remain on the skin and/or likelihood of the fragrance ingredient being removed by washing. The resultant calculation represents the total consumer exposure (mg/kg/day) (Cadby et al., 2002; Ford et al., 2000).

This is a conservative calculation of dermal systemic exposure because it makes the unlikely assumption that a consumer will use these 10 products which are all perfumed with the upper 97.5 percentile level of the fragrance ingredient from a fine fragrance type of the product (Cadby et al., 2002; Ford et al., 2000). The 97.5 percentile use level in formulae for use in cosmetics in general has been reported to be 1.13% (IFRA, 2004), which would result in a maximum daily exposure on the skin of 0.0288 mg/kg for high end users (see Table 1).

A maximum skin level is then determined for consideration of potential sensitization. The exposure is calculated as the percent concentration of the fragrance ingredient applied to the skin based on the use of 20% of the fragrance mixture in the fine fragrance consumer product (IFRA, 2004). The average maximum use level in formulae that goes into fine fragrances has been reported to be 0.08% (IFRA, 2004); assuming use of the fragrance oil at levels up to 20% in the final product.