Update to RIFM fragrance ingredient safety assessment, benzyl acetate, CAS Registry Number 140-11-4

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https://doi.org/10.1016/j.fct.2022.113186

Received 11 February 2022; Received in revised form 12 May 2022; Accepted 25 May 2022
Available online 28 May 2022
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Benzyl acetate was evaluated for genotoxicity, repeated dose toxicity, reproductive toxicity, local respiratory toxicity, phototoxicity/photoallergenicity, skin sensitization, and environmental safety. Data show that benzyl acetate is not genotoxic, provide a calculated Margin of Exposure (MOE) > 100 for the repeated dose toxicity, reproductive toxicity, and local respiratory toxicity endpoints, and show that there are no safety concerns for benzyl acetate for skin sensitization under the current declared levels of use. The phototoxicity/photoallergenicity endpoints were evaluated based on data and ultraviolet/visible (UV/Vis) spectra; benzyl acetate is not phototoxic/photoallergenic. The environmental endpoints were evaluated; benzyl acetate was found not to be Persistent, Bioaccumulative, and Toxic (PBT) as per the International Fragrance Association (IFRA) Environmental Standards, and its risk quotients, based on its current volume of use in Europe and North America (i.e., Predicted Environmental Concentration/Predicted No Effect Concentration [PEC/PNEC]), are <1.

### Human Health Safety Assessment

**Genotoxicity:** Not genotoxic.

**Repeated Dose Toxicity:** NOAEL = 260 mg/kg/day.

**Reproductive Toxicity:** Developmental NOAEL = 100 mg/kg/day; Fertility NOAEL = 460 mg/kg/day.

**Skin Sensitization:** No concern for skin sensitization under the current, declared levels of use.

**Phototoxicity/Photoallergenicity:** Not phototoxic/not expected to be photoallergenic.

**Bioaccumulation:** Not PBT or vPvB as per IFRA Environmental Standards

**Environmental Safety Assessment**

**Risk Assessment:**

<table>
<thead>
<tr>
<th>Screening-level:</th>
<th>PEC/PNEC (North America and Europe)</th>
<th>RIFM Framework; Salvito et al., 2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Ecotoxicity Endpoint: 28-day fish chronic</td>
<td>NOEC: 0.92 mg/L</td>
<td>(Holcombe et al., 1995)</td>
</tr>
<tr>
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<td>RIFM PNEC tc: 18.4 μg/L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* Revised PEC/PNECs (2015 IFRA VoU): North America and Europe &lt;1</td>
<td></td>
</tr>
</tbody>
</table>

### 1. Identification

1. **Chemical Name:** Benzyl acetate
2. **CAS Registry Number:** 140-11-4
3. **Synonyms:** Acetic acid, phenylmethyl ester; Bentine; Benzyl ethanoate; Methyl α-toluate; Methyl phenylethanoate; Methyl benzeneacetate; Acetic acid, benzyl ester; Phenylmethyl acetate; トリフタール酸(C = 1 − 5)酸甲基トリフタール酸エチルメチル塩(C = 1 − 6); Benzyl acetate
4. **Molecular Formula:** C₉H₁₀O₂
5. **Molecular Weight:** 150.17 g/mol
6. **RIFM Number:** 106

### 2. Physical data

1. **Boiling Point:** 216 °C (Fragrance Materials Association [FMA]), 215.57 °C (EPI Suite)
2. **Flash Point:** 195 °F; CC (FMA), 102 °C (Globally Harmonized System)
3. **Log Kow:** 2.0 at 35 °C (RIFM, 2004d), 2.08 (EPI Suite)
4. **Melting Point:** -0.5 °C (EPI Suite)
5. **Water Solubility:** 1605 mg/L (EPI Suite)
6. **Specific Gravity:** 1.06 g/mL (RIFM, 1994b), 1.054–1.058 (FMA), 1.052–1.056 (FMA)
6.1. Cramer Classification

Expert Judgment  Toxtree v3.1  OECD QSAR Toolbox v4.2
Class I, Low.

6.2. Analogs selected

a. Genotoxicity: None
b. Repeated Dose Toxicity: None
c. Reproductive Toxicity: None
d. Skin Sensitization: None
e. Phototoxicity/Photoallergenicity: None
chromosomal aberrations and unscheduled DNA synthesis assays demonstrated a lack of genotoxic potential (NTP, 1993; Steinmetz and Mirsalis, 1984). In a study performed by the NTP, B6C3F1 mice were administered daily intraperitoneal injections of benzyl acetate in corn oil for 3 days at doses of 0, 312.5, 625, and 1250 mg/kg. The animals were euthanized 24 h following the last injection, and bone marrow was assessed for the induction of micronucleated polychromatic erythrocytes. No significant increase in the frequency of micronucleated erythrocytes was observed (NTP, 1993). Under the conditions of the study, benzyl acetate was considered negative for chromosome damage in the in vivo micronucleus assay.

Based on the available data, benzyl acetate does not present a concern for genotoxic potential.

Additional References: NTP, 1993; Florin et al., 1980; Mortelmans et al., 1982; Yoo (1986); Caspary et al., 1988; Galloway et al., 1987; Rudd et al., 1983; Rogan et al., 1986; McGregor et al., 1988; Schunk et al., 1986; Longnecker et al., 1990; Elmore and Fitzgerald, 1990; Mirmulis et al., 1989; Mirmulis et al., 1983; Fourman et al., 1994; Steinmetz and Mirmulis, 1984; Yoshikawa (1996); Matsuoaka et al., 1996; Miyagawa et al., 1995; Mitchell and Caspary, 1987 Zimmermann et al., 1989; Honma et al., 1999; Kevekordes et al., 1999; Rossman et al., 1991; Witt et al., 2000; Sasaki et al., 2000; Brewer and Colditz, 1999; Kevekordes et al., 2001; Sekiashi et al., 2002; Yasunaga et al., 2004; Oda et al., 1978; Scott et al., 2007; Demir et al., 2010.


11.1.2. Repeated dose toxicity

The MOE for benzyl acetate is adequate for the repeated dose toxicity endpoint at the current level of use.

11.1.2.1. Risk assessment. There are sufficient repeated dose toxicity data on benzyl acetate. Groups of 10 F344/N rats/sex were fed diets containing benzyl acetate at doses of 0, 3130, 6250, 12500, 25000, or 50000 ppm (equivalent to 0, 230, 460, 900, 1750, or 3900 mg/kg/day for males and 0, 240, 480, 930, 1870, or 4500 mg/kg/day for females) for 13 weeks. Mortality was reported among high-dose group animals. Bodyweight gain and final body weights for the animals of the 25000-ppm dose group males were significantly lower than the control. There was a reduction in food consumption reported among 25000-ppm dose groups. Hepatocellular necrosis was reported among 1 high-dose group animal. There was no significant difference in terms of food consumption among the treated and control group mice. In another study, groups of 60 male and female B6C3F1 mice were fed benzyl acetate in the diet at concentrations of 0, 330, 1000, or 3000 ppm (equivalent to 0, 35, 110, or 345 mg/kg/day for the males and 0, 40, 130, or 375 for the females). The high-dose female mice showed a statistically significant increase in survival. The mean body weights of treated mice were significantly lower (2%-14%) than the controls, except for the 330-ppm groups. There was no significant difference in terms of food consumption among the treated and control group mice. In the 2-year NTP study with mice (NTP, 1993), benzyl acetate administration in the food of the female and male mice was associated with a dose-related increase in the incidence or severity of non-neoplastic nasal lesions (i.e., mucus atrophy and degeneration, cystic hyperplasia of the submucosal gland, and luminal exudates and pigmentation of the mucus epithelium). The study stated that, although the nose was not the deposition site for benzyl acetate, nasal tissue could have been exposed directly to high concentrations of the chemical or its degradation products (NTP, 1993). Thus, it was concluded that there was no evidence of carcinogenic activity among the animals treated with benzyl acetate via diet. Overall, the most conservative NOAEL of 6000 ppm or 260 mg/kg/day derived from the 2-year chronic study conducted on rats was considered.

Therefore, the benzyl acetate MOE for the repeated dose toxicity endpoint can be calculated by dividing the benzyl acetate NOAEL in mg/kg/day by the total systemic exposure to benzyl acetate, 260/0.015 or 17333.

In addition, the total systemic exposure to benzyl acetate (15 μg/kg/day) is below the TTC (30 μg/kg/day; Kroes et al., 2007) for the repeated dose toxicity endpoint for a Cramer Class I material at the current level of use.

Additional References: None.

Literature Search and Risk Assessment Completed On: 05/18/21.

11.1.3. Reproductive toxicity

The MOE for benzyl acetate is adequate for the reproductive toxicity endpoint at the current level of use.

11.1.3.1. Risk assessment. There are sufficient developmental toxicity data on benzyl acetate. In a developmental toxicity study, groups of 20-22 pregnant rats were gavaged daily from gestation days 6-15 with 0, 10, 100, 500, or 1000 mg/kg body weight/day benzyl acetate in olive oil. Body weights of the live 1000 mg/kg/day male and female fetuses were significantly reduced. The number of fetuses with internal
variations (dilation of the renal pelvis and dilation of the lateral ventricle) were significantly increased in the 500 and 1000 mg/kg/day litters. The number of fetuses with skeletal variations (wavy ribs; dumbbell shape of thoracic vertebra body; absence of thoracic vertebra body; splitting of thoracic vertebra body; lumbar ribs; and reduced ossification of cervical vertebra body, caudal vertebra body, and sternebrae) were significantly increased in the 1000 mg/kg/day litters. Within this dose range, benzyl acetate produced a delayed development of the fetuses at 1000 mg/kg/day but did not produce teratogenic effects. Thus, the developmental toxicity NOAEL was considered to be 100 mg/kg/day (Ishiguro et al., 1993). Therefore, the benzyl acetate MOE for the developmental toxicity endpoint can be calculated by dividing the benzyl acetate NOAEL in mg/kg/day by the total systemic exposure to benzyl acetate, 100/0.015 or 6667.

There are sufficient fertility data on benzyl acetate. Groups of 10 F344/N rats/sex were fed diets containing benzyl acetate at doses of 0, 3130, 6250, 12500, 25000, or 50000 ppm (equivalent to 0, 230, 460, 900, 1750, or 3900 mg/kg/day for males and 0, 240, 480, 930, 1870, or 4500 mg/kg/day for females) for 13 weeks. Detailed histopathological evaluations were performed on all control, 25000- and 50000-ppm dose group rats, including the male (preputial, prostate, testis with epididymis and seminal vesicles) and female (ovary, preputial or clitoral glands, and uterus) reproductive organs. The tests and epididymis were evaluated for males of the 6250- and 12500-ppm dose groups as well. Sperm morphology and vaginal cytology were evaluated among all control and treated rats. Results showed mild to moderate aspermato genesis among the high-dose males and atrophy of the seminiferous tubules among the 12500- and 25000-ppm dose group males. No other test material lesions were reported among the 6250-ppm or lower dose group animals. There were no treatment-related alterations in sperm morphology or estrous cycles reported among treated animals. Thus, the NOAEL for the reproductive toxicity was considered to be 6250 ppm, or 7900 or 9400 mg/kg/day for males and females, respectively (NTP, 1993).

Thus, the NOAEL for the reproductive toxicity was considered to be 6250 ppm, or 7900 or 9400 mg/kg/day for males and females, respectively (NTP, 1993).

Additional References: None.

Literature Search and Risk Assessment Completed On: 05/18/21.

11.1.5. Phototoxicity/photoallergenicity

Based on the existing data and available UV/Vis absorption spectra, benzyl acetate does not present a concern for phototoxicity or photoallergenicity.

11.1.5.1. Risk assessment. UV/Vis absorption spectra (OECD TG 101) for benzyl acetate demonstrate no absorbance between 290 and 700 nm. In a guinea pig phototoxicity study, no reactions indicative of phototoxic responses were observed after application of 3% or 10% benzyl acetate (RIFM, 1983). Based on the existing in vivo data and the lack of absorbance in the critical range, benzyl acetate does not present a concern for phototoxicity or photoallergenicity.

11.1.5.2. UV spectra analysis. UV/Vis absorption spectra (OECD TG 101) for benzyl acetate were obtained. The spectra indicate no absorbance in the range of 290–700 nm. The molar absorption coefficient is below the benchmark of concern for phototoxic effects, 1000 L mol⁻¹ cm⁻¹ (Henry et al., 2009).

Additional References: None.


11.1.6. Local respiratory toxicity

The MOE for benzyl acetate is adequate for the respiratory endpoint at the current level of use.

11.1.6.1. Risk assessment. The inhalation exposure estimated for combined exposure was considered along with toxicological data observed in the scientific literature to calculate the MOE from inhalation exposure when used in perfumery. In a 2-week acute study conducted in rats with nose-only inhalation exposure, a NOAEC of 614 mg/m³ was reported for benzyl acetate (RIFM, 2013). Test material-related higher levels of lactate dehydrogenase were noted in the bronchoalveolar lavage fluid. Although the authors did not consider these effects as adverse, for the purpose of estimating local respiratory toxicity MOE, a NOAEC of 61.4 mg/m³ (the mid-dose given) was considered.

This NOAEC expressed in mg/kg lung weight/day is:

\[(61.4 \text{ mg/m}^3)/(1 \text{m}^3/1000L) = 0.0614 \text{ mg/L} \]

11.1.4. Skin sensitization

Based on the existing data, benzyl acetate presents no concern for skin sensitization under the current, declared levels of use.

11.1.4.1. Risk assessment. Based on the existing data, benzyl acetate does not present a concern for skin sensitization. The chemical structure of this material indicates that it would be expected to react with skin proteins directly (Roberts et al., 2007; Toxtree v3.1.0; OECD Toolbox v4.2). However, in several guinea pig test methods, no reactions indicative of sensitization were observed with benzyl acetate (RIFM, 1985b; RIFM, 1986; RIFM, 1985a; RIFM, 1985c). No sensitization reactions were observed when benzyl acetate was tested in a human maximization test (Greif, 1967). Additionally, in several Confirmation of No Induction in Humans tests (CNIHs) up to 8% (9448 μg/cm²) of benzyl acetate in 3:1 ethanol:diethyl phthalate (EtOH:DEP), no reactions indicative of sensitization were observed (RIFM, 1987; RIFM, 1988a; RIFM, 1975c; RIFM, 1988b; RIFM, 1988c; RIFM, 1988d; RIFM, 1975d; RIFM, 1975c; RIFM, 1975h; RIFM, 1975a).

Based on weight of evidence (WoE) from structural analysis and animal and human studies, benzyl acetate does not present a concern for skin sensitization under the current, declared levels of use.

Additional References: None.

Literature Search and Risk Assessment Completed On: 05/18/21.

11.1.3. Genotoxicity

As benzyl acetate has no absorbance between 290 and 700 nm, it was considered not to be genotoxic by UV/Vis absorption spectra. In the mutagenicity testing, benzyl acetate was not mutagenic in the Ames test, the UDS test, the In vitro test with mammalian cells, and the In vivo test with rat bone marrow cells.

Additional References: None.

Literature Search and Risk Assessment Completed On: 05/18/21.

11.1.2. Local systemic toxicity

In a 13-week study conducted on rats with combined oral and inhalation exposure, no NOAELs were determined for the oral and inhalation endpoints. For the systemic exposure, a NOAEL of 50000 ppm or 7900 or 9400 mg/kg/day for males and females was determined. Considering the total systemic exposure of benzyl acetate, the MOE for the systemic toxicity endpoint can be calculated by dividing the benzyl acetate NOAEL in mg/kg/day by the total systemic exposure to benzyl acetate, 100/0.015 or 6667.

There are sufficient fertility data on benzyl acetate. Groups of 10 B6C3F1 mice/sex were fed diets containing benzyl acetate at doses of 0, 425, 1000, 2000, 3700 or 7900 mg/kg/day for males and 0, 650, 1000, 1750, or 3900 mg/kg/day for females for 13 weeks. Detailed histopathological evaluations were performed on all control, 25000- and 50000-ppm dose group animals. There were no treatment-related alterations in sperm morphology or estrous cycles reported among treated animals. Thus, the NOAEL for the reproductive toxicity was considered to be 6250 ppm, or 7900 or 9400 mg/kg/day for males and females, respectively (NTP, 1993).

Based on the NOAEL of 6250 ppm or 7900 or 9400 mg/kg/day, the total systemic exposure to benzyl acetate was calculated by dividing the benzyl acetate NOAEL in mg/kg/day by the total systemic exposure to benzyl acetate, 100/0.015 or 6667.

Additional References: None.

Literature Search and Risk Assessment Completed On: 05/18/21.

11.1.1.1. Risk assessment. The inhalation exposure estimated for combined exposure was considered along with toxicological data observed in the scientific literature to calculate the MOE from inhalation exposure when used in perfumery. In a 2-week acute study conducted in rats with nose-only inhalation exposure, a NOAEC of 614 mg/m³ was reported for benzyl acetate (RIFM, 2013). Test material-related higher levels of lactate dehydrogenase were noted in the bronchoalveolar lavage fluid. Although the authors did not consider these effects as adverse, for the purpose of estimating local respiratory toxicity MOE, a NOAEC of 61.4 mg/m³ (the mid-dose given) was considered.

This NOAEC expressed in mg/kg lung weight/day is:

\[(61.4 \text{ mg/m}^3)/(1 \text{m}^3/1000L) = 0.0614 \text{ mg/L} \]
- Minute ventilation of 0.17 L/min for a Sprague Dawley rat \times \text{duration of exposure of 360 min per day (min/day)} \text{(according to GLP study guidelines)} = 61.2 \text{ L/day}
- \((0.0614 \text{ mg/L}) \times (61.2 \text{ L/day}) = 3.76 \text{ mg/day}
- \((3.76 \text{ mg/day})/(0.0016 \text{ kg lung weight of rat}^*) = 2350 \text{ mg/kg lung weight/day})

The 95th percentile calculated exposure was reported to be 0.26 mg/day—this value was derived from the concentration survey data in the Creme RIFM exposure model (Comiskey et al., 2015; Safford, 2015). To compare this estimated exposure with the NOAEC expressed in mg/kg lung weight/day, this value is divided by 0.65 kg human lung weight (Carthew et al., 2009) to give 0.4 mg/kg lung weight/day resulting in a MOE of 5875 (i.e., \((2350 \text{ mg/kg lung weight/day})/(0.4 \text{ mg/kg lung weight/day})\)).

The MOE is greater than 100. Without adjustment for specific uncertainty factors related to inter-species and intra-species variation, the material exposure by inhalation at 0.30 mg/day is deemed to be safe under the most conservative consumer exposure scenario.


Additional References: Troy (1977); UGCM, 1997; Silver (1992); RIFM, 1997; RIFM, 2003b; RIFM, 2003c; Rogers et al., 2003a; RIFM, 2003d; RIFM, 2003a; RIFM, 2004a; RIFM, 2004b; Isola et al., 2004a; Rogers et al., 2005; RIFM, 2014; Vethanayagam et al., 2013.

Literature Search and Risk Assessment Completed On: 06/03/21

11.2. Environmental endpoint summary

11.2.1. Screening-level assessment

A screening-level risk assessment of benzyl acetate was performed following the RIFM Environmental Framework (Salvito et al., 2002), which provides 3 tiered levels of screening for aquatic risk. In Tier 1, only the material’s regional VoU, its log \(K_{OW}\), and its molecular weight are needed to estimate a conservative risk quotient (RQ), expressed as a ratio Predicted Environmental Concentration/Predicted No Effect Concentration (PEC/PNEC). A general QSR with a high uncertainty factor applied is used to predict fish toxicity, as discussed in Salvito et al. (2002). In Tier 2, the RQ is refined by applying a lower uncertainty factor to the PNEC using the ECOSAR model (US EPA, 2012b), which provides chemical class-specific ecotoxicity estimates. Finally, if necessary, Tier 3 is conducted using measured biodegradation and ecotoxicity data to refine the RQ, thus allowing for lower PNEC uncertainty factors.

The data for calculating the PEC and PNEC for this safety assessment are provided in the table below. For the PEC, the range from the most recent IFRA Volume of Use Survey is reviewed. The PEC is then calculated using the actual regional tonnage, not the extremes of the range. Following the RIFM Environmental Framework, benzyl acetate was identified as a fragrance material with the potential to present a possible risk to the aquatic environment (i.e., its screening-level PEC/PNEC \(>1\).

A screening-level hazard assessment using EPI Suite v4.11 (US EPA, 2012a) did not identify benzyl acetate as possibly persistent or bioaccumulative based on its structure and physical–chemical properties. This screening-level hazard assessment considers the potential for a material to be persistent and bioaccumulative and toxic, or very persistent and very bioaccumulative as defined in the Criteria Document (Api et al., 2015). As noted in the Criteria Document, the screening criteria applied are the same as those used in the EU for REACH (echa, 2012). For persistence, if the EPI Suite model BIOWIN 3 predicts a value < 2.2 and either BIOWIN 2 or BIOWIN 6 predicts a value < 0.5, then the material is considered potentially persistent. A material would be considered potentially bioaccumulative if the EPI Suite model BCFBAF predicts a fish BCF \(\geq 2000\) L/kg. Ecotoxicity is determined in the above screening-level risk assessment. If, based on these model outputs (Step 1), additional assessment is required, a WoE-based review is then performed (Step 2). This review considers available data on the material’s physical–chemical properties, environmental fate (e.g., OECD Guideline biodegradation studies or die-away studies), fish bioaccumulation, and higher-tier model outputs (e.g., US EPA’s BIOWIN and BCFBAF found in EPI Suite v4.11). Data on persistence and bioaccumulation are reported below and summarized in the Environmental Safety Assessment section prior to Section 1.

11.2.2. Risk assessment

Based on the current Volume of Use (2015), benzyl acetate presents a risk to the aquatic compartment in the screening-level assessment.

11.2.2.1. Key studies. Biodegradation:

RIFM, 1994b: A study was conducted to determine the ready and ultimate biodegradability of the test material using the sealed vessel test according to the OECD 301B method. The biodegradation rate was 99.7% on day 28.

RIFM, 1992: Degradation of the test material was evaluated using the modified OECD screening test according to Method C.4-B. Degradation of 100% was determined after 28 days.

RIFM, 2012: The ready biodegradability of the test material was evaluated using the manometric respirometry test according to the OECD 301 F guideline. Biodegradation of 85% was observed after 28 days and 92% after 54 days.

Ecotoxicity:

RIFM, 2011: A Daphnia magna immobilization study following OECD TG 202 was reported under flow-through conditions. The 48-h EC50 value based on the mean measured concentration was reported to be 37 mg/L.

RIFM, 1994a: A 96-h acute toxicity study was conducted with Zebrafish. The 96-h LC0 was 4.6 mg/L (arithmetic mean of analytical values); LC100: 13.7 mg/L (arithmetic mean of analytical values) and the geometric mean: LC0/LC100: 7.9 mg/L.

Holcombe et al., 1995: The 96-h LC50 of benzyl acetate in juvenile Japanese medaka (Oryzias latipes) fish was 4.00 mg/L, based on nominal test concentration.

Holcombe et al., 1995: A 28-day chronic study with benzyl acetate was carried out under flow-through test conditions with medaka (Oryzias latipes). The chronic MATC was calculated to be 1.33 mg/L. NOEC value was 0.92 mg/L.

Other available data:

Benzyl acetate has been registered for REACH, and the following additional data is available (echa, 2011):

The ready biodegradability of the test material was evaluated using the CO2 evolution test according to the OECD 301B guideline. Degradation of 100.9% was observed after 28 days.

A 48-h Daphnia magna acute study was conducted according to the OECD 202 guidelines under semi-static conditions. The 48-h EC50 value based on nominal test concentration was reported to be 17 mg/L.

A 72-h algae inhibition test was conducted according to the OECD 201 method under static conditions. The following EC50s were reported: 110 mg/L and 92 mg/L for growth rate and biomass, respectively. The 72-h NOEC based on the mean measured concentration was reported to be 52 mg/L. All the test results are based on the mean measured concentration.

11.2.2.2. Risk assessment refinement

The REACH dossier reports a PNEC of 4 \(\mu\)g/L, which has been calculated based on an acute study. For a more conservative approach, the PNEC in this document has been calculated based on an available chronic fish study (this study is also reported in the REACH dossier). However, both approaches result in PEC/PNEC<1.
Ecotoxicological data and PNEC derivation (all endpoints reported in mg/L; PNECs in μg/L).

Endpoints used to calculate PNEC are underlined.

<table>
<thead>
<tr>
<th>Exposure</th>
<th>LC50 (Fish) (\text{mg/L})</th>
<th>EC50 (Daphnia) (\text{mg/L})</th>
<th>EC50 (Algae) (\text{mg/L})</th>
<th>AF</th>
<th>PNEC (μg/L)</th>
<th>Chemical Class</th>
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Tier 3: Measured Data including REACH

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<th>LC50</th>
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<th>AF</th>
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</table>

Based on available data, the RQ for this material is < 1. No additional assessment is necessary.

The RIFM PNEC is 18.4 μg/L. The revised PEC/PNECs for EU and NA are <1; therefore, the material does not present a risk to the aquatic environment at the current reported VoU.

Literature Search and Risk Assessment Completed On: 06/14/21.

12. Literature Search*

- **RIFM Database**: Target, Fragrance Structure-Activity Group materials, other references, JECFA, CIR, SIDS
- **ECHA**: https://echa.europa.eu/
- **NTP**: https://ntp.niehs.nih.gov/
- **SciFinder**: https://scifinder.cas.org/scifinder/view/scifinder/scifinderExplore.jsf
- **National Library of Medicine’s Toxicology Information Services**: https://toxnet.nlm.nih.gov/
- **IARC**: https://monographs.iarc.fr
- **EPA ACToR**: https://actor.epa.gov/actor/home.xhtml
- **US EPA HPVIS**: https://ofmpub.epa.gov/opthpv/public_search.publicdetails?submission_id=24959241&ShowComments=Yes&qslstr=null&recordcount=0&User_title=DetailQuery%20Results&EndPointRpt=Y#submission
- **Japan Existing Chemical Data Base (JECDB)**: http://dra4.nihs.go.jp/mhlw_data/jsp/SearchPageENG.jsp
- **Google**: https://www.google.com
- **ChemIDplus**: https://chem.nlm.nih.gov/chemidplus/

Search keywords: CAS number and/or material names.

*Information sources outside of RIFM’s database are noted as appropriate in the safety assessment. This is not an exhaustive list. The links listed above were active as of 02/11/22.
Declarations of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome. RIFM staff are employees of the Research Institute for Fragrance Materials, Inc. (RIFM). The Expert Panel receives a small honorarium for time spent reviewing the subject work.

References


