



## RESORCINOL

**CAS number:** 108-46-3

**Synonyms:** 1,3-Benzenediol, m-dihydroxybenzene

**Chemical formula:** C<sub>6</sub>H<sub>6</sub>O<sub>2</sub>

### Workplace exposure standard (amended)

**TWA:** 10 ppm (45 mg/m<sup>3</sup>)

**STEL:** —

**Peak limitation:** —

**Notations:** Sk., DSEN

**IDLH:** —

**Sampling and analysis:** The recommended value is quantifiable through available sampling and analysis techniques.

### Recommendation and basis for workplace exposure standard

A TWA of 10 ppm (45 mg/m<sup>3</sup>) is recommended to protect for eye and skin irritation and dermatitis in exposed workers.

The previous STEL is recommended to be withdrawn as there is a lack of evidence for immediate acute toxicity within ten times of the recommended TWA.

### Discussion and conclusions

Resorcinol is used as a dye in permanent and semi-permanent hair dyes and as a colour additive and colourant in personal care products.

Critical effects of exposure are eye and skin irritation and dermatitis.

Toxicological data are limited. No complaints of irritation or discomfort are noted in a survey of 180 workers exposed at 10 ppm (45 mg/m<sup>3</sup>). No further information regarding this study is provided. In humans, dermal exposure is reported to cause dermatitis, hyperaemia and pruritus. Oral ingestion may cause methaemoglobinaemia, cyanosis and convulsions. No toxic effects are observed in rats, guinea pigs and rabbits exposed at 8 ppm (34 mg/m<sup>3</sup>) for two weeks (ACGIH, 2018). There is evidence for skin sensitisation in animals and it is supported by evidence of contact dermatitis in humans (NICNAS, 2016).

Given the limited available data, the TWA of 10 ppm (45 mg/m<sup>3</sup>) by SWA and ACGIH (2018) is recommended to be retained to limit irritant effects.

Insufficient data are available to recommend a STEL.

## **Recommendation for notations**

Not classified as a carcinogen according to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

Classified as a skin sensitiser but not a respiratory sensitiser according to the GHS.

A skin notation is warranted as evidence indicates contact dermatitis in humans and reports of systemic effects in animals.

DRAFT

## APPENDIX

### Primary sources with reports

Source	Year set	Standard
<b>SWA</b>	<b>1991</b>	<b>TWA: 10 ppm (45 mg/m<sup>3</sup>); STEL: 20 ppm (90 mg/m<sup>3</sup>)</b>
<b>ACGIH</b>	<b>2001</b>	<b>TLV-TWA: 10 ppm (45 mg/m<sup>3</sup>); TLV-STEL: 20 ppm (90 mg/m<sup>3</sup>)</b>
<p>TLV-TWA and TLV-STEL recommended to minimise the potential for eye and skin irritation and dermatitis.</p> <p>Summary of data:</p> <p>TLV-TWA and TLV-STEL are based on industrial experience and by analogy with TLVs for: phenol – TLV-TWA of 5 ppm (19 mg/m<sup>3</sup>) and catechol – TLV-TWA of 5 ppm (23 mg/m<sup>3</sup>).</p> <p>Human data:</p> <ul style="list-style-type: none"> <li>• Ingestion may cause methaemoglobinaemia, cyanosis, and convulsions, no further details</li> <li>• Dermal exposure reported to cause dermatitis, hyperaemia and pruritus</li> <li>• A survey of 180 workers reported no complaints of irritation or discomfort at 10 ppm, no further information.</li> </ul> <p>Animal data:</p> <ul style="list-style-type: none"> <li>• Reported to be less toxic than phenol or catechol by ingestion or skin penetration</li> <li>• LD<sub>50</sub>: 3.66 g/kg (rabbits, dermal)</li> <li>• Inhalation exposure at 1,733 ppm for 1 h or 625 ppm for 8 h did not cause deaths or lesions attributable to inhalation, no information on species provided</li> <li>• Application of 0.1 g into the eyes of rabbits caused discomfort, conjunctivitis and corneal ulcerations that were not reversible</li> <li>• No toxic effects observed in rats, guinea pigs and rabbits exposed at 8 ppm (34 mg/m<sup>3</sup>) for 6 h/d for 2 wk. No further information</li> <li>• Evidence of carcinogenicity in animal bioassays is negative or inadequate.</li> </ul> <p>Insufficient data to recommend a skin or sensitiser notation.</p>		
<b>DFG</b>	<b>2003</b>	<b>Not assigned</b>
<p>MAK not yet established due to lack of appropriate studies in humans and animals.</p> <p>No additional data.</p>		
<b>SCOEL</b>	<b>NA</b>	<b>NA</b>
No report.		
<b>OARS/AIHA</b>	<b>NA</b>	<b>NA</b>
No report.		

Source	Year set	Standard
<b>HCOTN</b>	<b>2004</b>	<b>TWA: 10 ppm (45 mg/m<sup>3</sup>)</b>
Administrative OEL.		
Summary of additional data:		
<ul style="list-style-type: none"> <li>Although the administrative TWA is the existing guideline value the following provides information and derivation relating to a recommended health-based OEL (HBROEL) (which is not legally enacted)</li> <li>The chronic NOAEL of 50 mg/kg/d based on ataxia, prostration, salivation and tremors observed in a long-term rat gavage study was used as the starting point for deriving the HBROEL of 10 mg/m<sup>3</sup> TWA: <ul style="list-style-type: none"> <li>the NOAEL is divided by an UF of 4 applied for allometric scaling from rats to humans based on caloric demand and an UF factor of 9 to account for intra- and interspecies variation to calculate a human NOAEL of 1.4 mg/kg/d</li> <li>the NOAEL in humans of 1.4 mg/kg/d is extrapolated to an equivalent inhalational NOAEC of 9.72 mg/m<sup>3</sup> assuming a 70 kg worker inhales 10 m<sup>3</sup> during an 8 h working day and the inhalational bioavailability is 100%</li> <li>the health-based TWA OEL of 10 mg/m<sup>3</sup> is rounded up of the NOAEC according to HCOTN methodology</li> <li>recommended OEL of 10 mg/m<sup>3</sup> considered sufficiently low to protect for irritation</li> </ul> </li> <li>A skin notation is not warranted.</li> </ul>		

## Secondary source reports relied upon

Source	Year	Additional information
NICNAS	✓ 2016	<ul style="list-style-type: none"> <li>In human patch tests, 4/302 hairdressers suffering from contact dermatitis reported a positive reaction, no further details available</li> <li>Positive skin sensitisation reported in mouse LLNA studies in 2 independent experiments (OECD TG 429)</li> <li>Considered to be a skin sensitiser based on evidence from guinea pig maximisation test.</li> </ul>

## Carcinogenicity — non-threshold based genotoxic carcinogens

Is the chemical mutagenic?

No

**The chemical is not a non-threshold based genotoxic carcinogen.**

## Notations

Source	Notations
SWA	—
HCIS	Skin sensitisation – category 1
NICNAS	Skin sensitisation
EU Annex	NA
ECHA	—



Source	Notations
ACGIH	Carcinogenicity – A4
DFG	Sh (dermal sensitiser)
SCOEL	NA
HCOTN	—
IARC	Carcinogenicity – Group 3
US NIOSH	NA

NA = not applicable (a recommendation has not been made by this Agency); — = the Agency has assessed available data for this chemical but has not recommended any notations

## Skin notation assessment

### Calculation

Adverse effects in human case study:

yes

Dermal LD<sub>50</sub> ≤ 1000 mg/kg:

no

Dermal repeat-dose NOAEL ≤ 200 mg/kg:

Dermal LD<sub>50</sub>/Inhalation LD<sub>50</sub> < 10:

*In vivo* dermal absorption rate > 10%:

Estimated dermal exposure at WES > 10%:

**a skin notation is warranted**

## IDLH

Is there a suitable IDLH value available?

No

## Additional information

Molecular weight:	110.1
Conversion factors at 25°C and 101.3 kPa:	1 ppm = 4.50 mg/m <sup>3</sup> ; 1 mg/m <sup>3</sup> = 0.222 ppm
This chemical is used as a pesticide:	<input type="checkbox"/>
This chemical is a biological product:	<input type="checkbox"/>
This chemical is a by-product of a process:	<input type="checkbox"/>
A biological exposure index has been recommended by these agencies:	<input type="checkbox"/> ACGIH <input type="checkbox"/> DFG <input type="checkbox"/> SCOEL

## Workplace exposure standard history

Year	Standard
<a href="#">Click here to enter year</a>	

## References

American Conference of Industrial Hygienists (ACGIH®) (2018) TLVs® and BEIs® with 7<sup>th</sup> Edition Documentation, CD-ROM, Single User Version. Copyright 2018. Reprinted with permission. See the [TLVs® and BEIs® Guidelines section](#) on the ACGIH website.

Deutsche Forschungsgemeinschaft (DFG) (2003) Resorcinol – MAK value documentation.

Health Council of the Netherlands (HCOTN) (2004) Resorcinol. Health-based calculated occupational cancer risk values. The Hague: Health Council of the Netherlands; publication no. 2000/15OSH/139.

International Agency for Research on Cancer (IARC) (1999) Resorcinol. IARC Monographs on the evaluation of the carcinogenic risk to humans.

National Industrial Chemicals Notification and Assessment Scheme (NICNAS) (2016) 1,3-Benzenediol: Human health tier II assessment – IMAP report.