Resorcinol

Resorcinol is commonly used in hair dyes and acne medication. In higher doses it is toxic and can disrupt the function of the central nervous system and lead to respiratory problems. It has also been shown to disrupt the endocrine system, specifically thyroid function.

WHAT IS RESORCINOL?

Resorcinol is primarily used by the rubber industry, especially in the production of tires; it is also used in high quality wood bonding, dyes, chemical fertilizers and in the manufacturing of certain chemicals.

Consumers are primarily exposed through cosmetic products such as hair dyes/bleaches, skin peels and treatments for a number of dermatological problems including acne and eczema.[2] [3][4]

In permanent hair dyes, resorcinol reacts with a developer (usually peroxide)to bond the dye permanently to the hairs. Resorcinol is usually used with other chemicals to get a specific dye color.[5] Typical resorcinol concentrations are about 1.25 percentalthough it can be found in concentrations up to 5 percent.

Resorcinol is used in acne and skin treatment medication to remove hard scaly or rough skin. The concentration in acne medicine is usually about two percent. When resorcinol is used as a dermatological treatment, it is likely to be applied to damaged skin, which allows more resorcinol to enter the body.[6]

Found In

- Most common in hair dyes
- Also in shampoos/hair lotions
- Peels and in products used to treat acne, eczema and other dermatological issues

What to look for on the label

- Resorcinol
- 1,3-benzenediol
- Resorcin
- 1,3-dihydroxybenzene(m-hydroxybenze, m-dihydroxyphenol)

Health Concerns

Endocrine Disruption: Evidence from case studies, animal studies and in vitro studies demonstrates that resorcinol disrupts thyroid function and that can manifest in hyperthyroidism and an enlargement of the thyroid gland also known as a goiter.[7],[8],[9],[10],[11]

Resorcinol has been shown to have two different effects: 1) the inhibition of enzymes involved in thyroid hormone synthesis; and 2) the activation of thyroid hormone receptors. Several studies indicate that resorcinol inhibits the activity of enzymes responsible for important stages of thyroid hormone synthesis. The enzymes are responsible for incorporating iodine in the creation of thyroid hormone. If the enzymes cannot produce thyroid hormone the body will sense a

deficiency and secrete thyroid stimulating hormone this will cause the gland to enlarge and will result in a goiter.[12],[13] An study of resorcinol's effects on cells, suggests that resorcinol acts like thyroid hormone and as an agonist at thyroid hormone receptors at low doses.[14]

Further research is needed to determine whether these different effects are a result of different exposure levels, and whether exposure to resorcinol through hair dye will have a significant adverse effect on the thyroid.

Organ system toxicity: Resorcinol can be acutely toxic in high concentrations or if consumed orally.[15] In these cases of resorcinol toxicity symptoms including convulsions, respiratory failure and cyanosis were reported. There are also effects on the central nervous system including drowsiness, unconsciousness, and seizures.[16],[17],[18] However, there is little evidence that these effects will result from chronic exposure at low concentrations.[19]

Skin irritant and sensitizer: Resorcinol is an acute irritant when in contact with the eyes.[20] There is also evidence that it is a skin irritant and sensitizer. Few reactions occur when the concentration is under two percent, but higher concentrations lead to increased number of reactions.[21]

Vulnerable Populations

Teenagers (https://www.safecosmetics.org/population/teenagers/), Workers (https://www.safecosmetics.org/population/workers/)

Regulations

Restricted in all types of cosmetics in Japan, The EU limits maximum concentrations and requires warning labels. The United States regulates the exposure to resorcinol for workers in certain manufacturing fields as well as in coal processing (resorcinol is a byproduct of coal manufacturing),[1] but not among salon workers.

How to Avoid?

Limit hair dying. Read labels and avoid products that contain resorcinol, 1,3-benzenediol, resorcin, 1,3- dihydroxybenzene (m-hydroxybenze, m-dihydroxyphenol).

Explore other Chemicals

Hydroquinone (https://www.safecosmetics.org/chemicals/hydroquinone/)

Phenoxyethanol (https://www.safecosmetics.org/chemicals/phenoxyethanol/)

Fragrance (https://www.safecosmetics.org/chemicals/fragrance/)

Nanomaterials (https://www.safecosmetics.org/chemicals/nanomaterials/)

1,4-DIOXANE (https://www.safecosmetics.org/chemicals/14-dioxane/)

Preservatives (https://www.safecosmetics.org/chemicals/preservatives/)

View All Chemicals of Concern > (/chemicals/)

Looking for a Safer Alternative?

Use Clearya's app to find non-toxic products! Clearya alerts you to toxics and helps you find safe products.

Clearya (https://www.clearya.com/)

Visit Clearya > (https://www.clearya.com/)

Your Action Helps

Together, we can make beauty safer for all.

Take Action Today!

(/take-action/)

FILTER BY:

By Population

By Products

By Health Concerns

References

[1] IARC (1987) Resorcinol. Available online: http://monographs.iarc.fr/ENG/Monographs/vol71/mono71-52.pdf (http://monographs.iarc.fr/ENG/Monographs/vol71/mono71-52.pdf). Accessed April 21, 2022.

[2] IPCS, IOMC, WHO (2006) Concise International Chemical Assessment Document 71: Resorcinol. Available online: http://apps.who.int/iris/bitstream/handle/10665/43450/9241530715_eng.pdf;jsessionid=60EFD20D61D7682814BAC172D64B3D70?sequence=1 (http://apps.who.int/iris/bitstream/handle/10665/43450/9241530715_eng.pdf;jsessionid=60EFD20D61D7682814BAC172D64B3D70?sequence=1). Accessed April 21, 2022.

[3] Lindsay R.H, Hill J.B, Gaitan E, Cooksey R.C, Jolley R.L, (1992) Antithyroid Effects of Coal Derived Pollutants, Journal of Toxicology and Environmental Health, 37(4), 467-481.

[4] Divi R, Doergel D, (1994)Mechanism-Based Inactivation of Lactoperoxidase and Thyroid Peroxidase by Resorcinol Derivatives, National Center for Toxicological Research.

[5] Shah M, Tolgyesi W, Britt A (1972) Cooxidation of p-phenylenediamine and resorcinol in hair dyes. Cosmetic Chemistry 23: 853-861.

[6] Welsch F. (2008) Routes and modes of administration of resorcinol and their relationship to potential manifestations of thyroid gland toxicity in animals and man. International Journal of Toxicology, 27(1): 59- 63.

[7] European commission: Scientific Committee on Consumer Products. Annex 13: List of 146 Substances with endocrine disruption classifications prepared in the Expert meeting. Available online at: http://ec.europa.eu/environment/archives/docum/pdf/bkh_annex_13.pdf (http://ec.europa.eu/environment/archives/docum/pdf/bkh_annex_13.pdf). Accessed April 21, 2022.

[8] Lindsay R.H, Hill J.B, Gaitan E, Cooksey R.C, Jolley R.L, (1992) Antithyroid Effects of Coal Derived Pollutants, Journal of Toxicology and Environmental Health, 37(4), 467-481.

[9] Divi R, Doergel D, (1994)Mechanism-Based Inactivation of Lactoperoxidase and Thyroid Peroxidase by Resorcinol Derivatives, National Center for Toxicological Research.

[10] Ghisari M, Bonefeld-Jorgensen E.C, (2009) Effects of plasticizers and their mixtures on estrogen receptor and thyroid hormone functions. Toxicology Letters 189: 67-77.

[11] Waring R, Ramsden D, Jarratt P, Harris R, (2012) Biomarkers of endocrine disruption: cluster analysis of effects of plasticizers on Phase 1 and Phase 2 metabolism of steroids. International Journal of Andrology 35: 415-423.

[12] Divi R, Doergel D, (1994)Mechanism-Based Inactivation of Lactoperoxidase and Thyroid Peroxidase by Resorcinol Derivatives, National Center for Toxicological Research.

[13] Lynch B, Delzell E, Bechtel D. (2002) Toxicology Review and Risk Assessment of Resorcinol: Thyroid Effects. Regulatory Toxicology and Pharmacology 36 (2): 198-210.

[14] Ghisari M, Bonefeld-Jorgensen E.C, (2009) Effects of plasticizers and their mixtures on estrogen receptor and thyroid hormone functions. Toxicology Letters 189: 67-77.

[15] Duran B, Gursoy S, Cetin M, Demirkoprulu N, Demirel Y, Gurelik B, (2004) The oral toxicity of resorcinol during pregnancy: a case report. Clinical Toxicology 42 (5): 663-666.

[16] Welsch F, Nemec M.D, Lawrence W.B, (2008) Two-generation reproductive toxicity study of resorcinol administered via drinking water to Crl:CD (SD) Rats. International Journal of Toxicology 27 (1): 43-57.

[17] Tush G.M, Kuhn R.J, (1996) Methemoglobinemia induced by an over-the-counter medication. The annals of Pharmacotherapy 30 (11): 1251-1254.

[18] Duran B, Gursoy S, Cetin M, Demirkoprulu N, Demirel Y, Gurelik B, (2004) The oral toxicity of resorcinol during pregnancy: a case report. Clinical Toxicology 42 (5): 663-666.

[19] Welsch F, Nemec M.D, Lawrence W.B, (2008) Two-generation reproductive toxicity study of resorcinol administered via drinking water to Crl:CD (SD) Rats. International Journal of Toxicology 27 (1): 43-57.

[20] IPCS, IOMC, WHO (2006) Concise International Chemical Assessment Document 71: Resorcinol. Available online: http://apps.who.int/iris/bitstream/handle/10665/43450/9241530715_eng.pdf;jsessionid=60EFD20D61D7682814BAC172D64B3[sequence=1 (http://apps.who.int/iris/bitstream/handle/10665/43450/9241530715_eng.pdf;jsessionid=60EFD20D61D7682814BAC172D64B3D70?sequence=1). Accessed April 21, 2022.

[21] Taravinen K. (1995) Analysis of patients with allergic patch test reactions to a plastic and glue series. Contact Dermatitis 32: 346-351.

Campaign for Safe Cosmetics (https://www.safecosmetics.org)

get to know us

about us (/about/)
see our financials (https://www.bcpp.org/about-us/financials/)
contact us (/contact/)
news (/news/)

take action

campaigns (/take-action/campaign/)
individuals (/take-action/)
businesses (/business/)
press (/take-action/media/)

get the facts

chemicals of concern (/chemicals/)
products of concern (/products/)
laws and regulations (/resources/regulations/)
tips (https://www.safecosmetics.org/resources/safe-cosmetics-tips/)

connect

(https://facebook.com/safecosmetics) (https://twitter.com/SafeCosmetics) (https://instagram.com/safecosmetics)

1388 Sutter Street, Suite 901
San Francisco, CA 94109-5400

BCPP is a 501(c)3 | EIN: 94-3155886 | Privacy Policy (https://www.bcpp.org/privacy-policy/) | Site Map (/sitemap_index.xml) | BCPP.org (https://www.bcpp.org/)