Preservatives

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WHAT ARE PRESERVATIVES & WHERE ARE THEY FOUND?

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Parabens are not water-soluble and can penetrate the skin. As a result, repeated application of a product or multiple products containing parabens could mean almost continuous exposure.[1] Parabens have been found in nearly all urine samples from U.S. adults regardless of ethnic, socioeconomic or geographic backgrounds.[2]

Formaldehyde-releasing preservatives slowly release formaldehyde which kills bacteria in water-based products. A study determined that longer storage time and higher temperature increase the amount of formaldehyde released from formaldehyde-releasing preservatives and could ultimately lead to more severe health concerns.[3]

Other preservatives are emerging as replacements.

In our 2016 report focusing on kids' makeup products we found at least one paraben, an endocrine disrupting compound, in 34% of products just from reading the labels. Two or three parabens were found in 3% of the products. We also found formaldehyde-releasing preservatives in 3% of the products from label reading.[4]

A recent biomonitoring study conducted at UC Berkeley found a big drop in the chemical body burdens of a dozen California teens who switched up their beauty regime. The girls saw reductions of 25 to 40 percent in 4 endocrine disrupting chemicals – phthalates, parabens, ticlosan, oxybenzone – after only 3 days of switching from products that contained these harmful chemicals to products that did not.[5] This study demonstrates that if you take toxic chemicals out of cosmetics you can take them out of people in just a few days.

Found In

- Fragrance
- Lipstick
- Shampoos
- Conditioners
- Lotions

- Moisturizer
- Facial and shower cleansers
- Nail polish
- Nail glue
- Hair gel
- Hair- smoothing products
- Baby shampoo
- Body wash/soap
- Color cosmetics
- Anti-aging products.

What to look for on the label

- Formaldehyde
- DMDM hydantoin
- Quaternium-15
- Imidazolidinyl urea
- Diazolidinyl urea
- Polyoxymethylene urea
- Sodium hydroxymethylglycinate
- 2-bromo-2-nitropropane-1,3-diol (bromopol) and glyoxal
- Ethylparaben
- Butylparaben
- Methylparaben
- Propylparaben
- Isobutylparaben
- Isopropylparaben
- Other ingredients ending in –paraben
- Benzylate
- Benzoic acid
- Benzyl ester
- Methylisothiazolinone (MIT): 2-methyl-4-isothiazoline-3-one, Neolone 950 preservative, MI, OriStar MIT and Microcare MT.
- Methylchloroisothiazolinone (CMIT): 5-Chloro-2-methyl-4-isothiazolin-3-one and MCI. Phenoxyethanol, 2-Phenoxyethanol, Euxyl K® 400 (mixture of Phenoxyethanol and 1,2-dibromo-2,4-dicyanobutane), PhE. Triclosan (TSC) and triclocarban (TCC). Also, check for benzyl alcohol, benzalkonium chloride, citric acid, dehydroacetic acid, essential oils, grapefruit seed extract, lactic acid, levulinic acid, potassium sorbate, sodium dehydroacetate, sodium metabisulfite, sodium salicylate, sorbic acid, vitamin E, zinc pyrithione.

Health Concerns

Parabens: Studies demonstrate that at sufficient concentrations, parabens (/chemicals/parabens/) can increase cell proliferation in human breast cancer MCF-7 cells, which are often used as a sensitive measure of estrogenic activity.[6] Parabens are potential endocrine disruptors due to their ability to mimic estrogen.[7] In cell studies, parabens have been found to weakly bind to estrogen receptors.[8]

Propyl paraben is also a reproductive toxin as it affects the male reproduction system and reduces sperm production and testosterone levels.[9][10][11]

Butyl paraben, specifically, appears to disrupt the male reproductive system and affect reproductive organs.[12][13]

Methyl paraben and other parabens in personal care products can lead to UV-induced damage of skin cells and disruption of cell proliferation (cell growth rate).[14] [15] Of the parabens, methyl paraben is generally of lower concern, because it is less estrogenic.

Ethyl paraben is listed as a potential endocrine disruptor by the TEDX Endocrine Disruption Exchange.[16][17]

Isobutylparaben exposure in rats has demonstrated increased uterus weight and uterine sensitivity to estrogen in the offspring.[18]

Formaldehyde: Formaldehyde is classified as a known human carcinogen by the National Toxicology Program[19] and the International Agency for Research on Cancer. [20]

Formaldehyde-releasing preservatives: These preservatives release small amounts of formaldehyde (/chemicals/formaldehyde/) over time.

DMDM hydantoin is a formaldehyde-releasing preservative (FRP) used to prevent microbes from growing in water-based products. It can be found in many personal care products.[21]

Diazolydinal urea releases the most formaldehyde of any formaldehyde-releasing preservative.[22]

Imidiazoldinal urea is one of the most common antimicrobial agents used in personal care products and is often combined with parabens.[23]

Quaternium-15 is the most sensitizing of these FRPs and is found in blush, mascara, lotion, and shampoo.[24] A study revealed that about 22.3% of consumers are allergic to quaternium-15.[25]

Bronopol (2-Bromo-2-Nitropropane) is a formaldehyde-releasing preservative. It is listed as a potential endocrine disruptor.[26] It is also very toxic to aquatic life and can cause skin irritation and respiratory irritation.[27][28]

Isothiazolinones: Studies show that isothiazolinones (/chemicals/methylisothiazolinone/) have caused allergic cosmetic dermatitis[29] in many European countries.[30]

Methylisothiazolinone (MIT) is one of the most predominant contact allergens found in cosmetic products.[31] MIT has also been linked to organ system toxicity[32] and neurotoxicity.[33]

Methylchloroisothiazolinones (CMIT/MCI) in a clinical study, researchers found that dermal irritation most commonly occurs in products with CMIT and MIT/CMIT mixtures, but is not as common in products with only MIT.[34][35]

The following preservatives are increasingly used in personal care products. Few studies examine the health effects of these compounds at the levels used in personal care products.

Benzyl benzoate: One study found that benzyl benzoate demonstrated estrogenic responses in a human breast cancer cell line in culture, which indicates the ability of a substance to mimic estrogen.[36] Benzyl Benzoate is a skin and eye irritant and may severely irritate, burn and sting the genitalia and scalp.[37]

Benzyl Alcohol: is used as preservative, solvent and local anesthetic, reported to cause contact urticaria, also known as hives or a skin rash with red, raised, itchy bumps, in some occupational settings.[38] It can be a skin irritant and inhalation of high concentrations may cause central nervous system effects and may cause skin sensitization in repeated or prolonged exposure.[39]

Benzalkonium Chloride: Benzalkonium chloride is linked to occupational asthma.[40] Short-term exposure is corrosive to the eyes, the skin, and the respiratory tract.[41]

Citric Acid: Short-term exposure to citric acid is irritating to the eyes, and skin and the respiratory tract. Long-term (often occupational) exposure may cause erosion of the teeth.[42] It has caused cough in acute inhalation studies of guinea pigs,[43] ataxia, and respiratory depression in mice.[44]

Dehydroacetic Acid: Dehydroacetic acid can lead to seizures in monkeys[45] and severe hemorrhage in multiple organs in rats.[46]

Essential Oils: Essential oils may contain naturally occurring constituents, ingredients such as pulegone or methyleugenol that may be carcinogenic and alter endocrine functioning.[47][48][49]

Methyleugenol (eugenyl methyl ether) can affect multiple endocrine systems[50] and is listed as a possible human carcinogen by the NTP,[51] IARC[52] and on The California Proposition 65.[53]

Grapefruit Seed Extract (GSE): Grapeseed extract is a low concern on its own, but may also be an ineffective preservative. It has been found that sometimes GSE is preserved with other preservatives,[54] which lead to both its efficacy and health concerns: benzethonium chloride,[55][56][57] *methylparaben* (see parabens) and ***triclosan*** (see below).

Lactic Acid: Lactic acid irritates the skin and the respiratory tract, and is corrosive to the eyes and to the digestive tract when swallowed.[58][59]

Levulinic Acid: Is known to be a moderate skin and eye irritant and is harmful when ingested.[60]

Phenoxyethanol: Skin exposure to phenoxyethanol has been linked to allergic reactions ranging from eczema and hives[61] to anaphylaxis.[62] Acute nervous system effects have been seen in infants who have had oral exposure to phenoxyethanol.[63]

Potassium Sorbate: Potassium sorbate may lead to eye irritation[64] and contact dermatitis.[65]

Sodium Dehydroacetate (DHA-S): DHA-S lead to hemorrhage in multiple organs and prolongation of blood coagulation factors in a study of rats.[66]

Sodium Metabisulfite (SMB): Studies have found that inhaled SMB causes may exacerbate asthma symptoms.[67] SMB has also been found to cause dermatitis[68] in occupational settings.[69]

Sorbic acid: Sorbic acid has been associated with skin irritation, contact urticaria, also known as hives or a skin rash with red, raised, itchy bumps, as well as redness of the skin (erythema), abnormal accumulation of fluid (edema), and inflammation of the skin.[70]

Triclocarban: Triclocarban (/chemicals/triclosan/) is a potential endocrine disruptor.[71] Studies have found that exposure to triclocarban in personal care products may amplify the effects of endogenous hormones and enhance testosterone.[72] It is also a skin, eye, and respiratory tract irritant.[73]

Triclosan (TSC): There is evidence that triclosan (/chemicals/triclosan/) is an endocrine disruptor[74][75] and impacts thyroid function.[76][77] A number of studies indicate that triclosan promotes bacteria that are resistant to both antibiotic medications and antibacterial products.[78][79]Evidence also shows triclosan bioaccumulates and can harm the environment.[80][81]

Vitamin E (tocopherol): One or more animal studies show tumor formation at high doses.[82][83] Dietary supplementation with vitamin E has been shown to significantly increase the risk of prostate cancer among healthy men.[84]

Zinc Pyrithione (Zpt): *Studies have found that Zpt induced significant developmental malformations on fish larvae.*[85]

Other preservatives: Several other preservatives may be used in personal care products, despite a lack of data on their health effects: anisic acid, salicylic acid, chlorphenism, stearalkonium chloride, sodium salicylate (aspirin), chlorhexidine digluconate, polyaminopropyl biguanide, and neem oil.

Vulnerable Populations

Babies & Children (https://www.safecosmetics.org/population/babies-children/), Pregnant Women (https://www.safecosmetics.org/population/pregnant-women/), Workers (https://www.safecosmetics.org/population/workers/)

Regulations

Formaldehyde is banned from use in cosmetics and toiletries in Japan and Sweden;[86] in the EU, restricted in personal care products, and labeling is required in products that do contain these chemicals;[87] concentration restrictions in Canada.[88] Some forms of parabens are banned in Denmark (propyl and butyl paraben, their isoforms and salts) in cosmetic products for children up to years.[89] The FDA doesn't have special rules that apply only to preservatives in cosmetics.[90]

European Regulation (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009R1223) The EU regulates what and how much of various preservatives are allowed in cosmetics. It is one of the most comprehensive regulatory cosmetic/personal care guidelines, setting the standard for many regulatory agencies around the world. Included on the list are preservatives such as: triclosan, triclocarban, phenoxyethanol, benzyl benzoate, methylisothiazolinone, zinc pyrithione, benzalkonium chloride, benzyl alcohol, and some essential oils.

How to Avoid?

Read labels, and avoid products with most parabens and all formaldehyde-releasing preservatives. If you are sensitive to other ingredients (e.g., allergens like methyisothiazolinone), avoid those ingredients as well.

Explore other Chemicals

Ethoxylated Ingredients (https://www.safecosmetics.org/chemicals/ethoxylated-ingredients/)

Retinol and Retinol Compounds (https://www.safecosmetics.org/chemicals/retinol-and-retinol-compounds/)

Quaternium-15 (https://www.safecosmetics.org/chemicals/quaternium-15/)

Formaldehyde And Formaldehyde-Releasing Preservatives (https://www.safecosmetics.org/chemicals/formaldehyde/)

Polyacrylamide (https://www.safecosmetics.org/chemicals/polyacrylamide/)

Carcinogens in Cosmetics (https://www.safecosmetics.org/chemicals/known-carcinogens/)

View All Chemicals of Concern > (/chemicals/)

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References

[1] Prusakiewicz JJ, Harville HM, Zhang Y, Ackermann C, Voorman RL. Parabens inhibit human skin estrogen sulfotransferase activity: possible link to paraben estrogenic effects. Toxicology. 2007 Apr 11;232(3):248-56.

[2] Ye X., et al., Parabens as urinary biomarkers of exposure in humans. Environmental Health Perspectives, vol. 114, pp 1843-1846, 2006. Available online: https://pubmed.ncbi.nlm.nih.gov/17185273/ (https://pubmed.ncbi.nlm.nih.gov/17185273/). Accessed April 22, 2022.

[3] Lv, C., Hou, J., Xie, W., & Cheng, H. (2015). Investigation on formaldehyde release from preservatives in cosmetics. International journal of cosmetic science.

[4] Engel C, Nudelman MA, Rasanayagam S, Witte M. Pretty Scary 2 Unmasking toxic chemicals in kids' makeup. Campaign for Safe Cosmetics. 2016 Oct. Available online: http://www.safecosmetics.org/wp-content/uploads/2016/10/Pretty-Scary_2016.pdf (http://www.safecosmetics.org/wp-content/uploads/2016/10/Pretty-Scary_2016.pdf). Accessed April 22, 2022.

[5] Harley KG, Kogut K, Madrigal DS, Cardenas M, Vera I, Meza-Alfaro G, She J, Gavin Q, Zahedi R, Bradman A, Eskenazi B. Reducing phthalate, paraben, and phenol exposure from personal care products in adolescent girls: Findings from the HERMOSA intervention study. Environ. Health Perspect. 2016 Mar 7.

[6] Darbre PD, Harvey PW. Paraben esters: review of recent studies of endocrine toxicity, absorption, esterase and human exposure, and discussion of potential human health risks. Journal of applied toxicology. 2008 Jul 1;28(5):561-78.

[7] Darbre PD, Harvey PW. Paraben esters: review of recent studies of endocrine toxicity, absorption, esterase and human exposure, and discussion of potential human health risks. Journal of applied toxicology. 2008 Jul 1;28(5):561-78.

[8] Prusakiewicz JJ, Harville HM, Zhang Y, Ackermann C, Voorman RL. Parabens inhibit human skin estrogen sulfotransferase activity: possible link to paraben estrogenic effects. Toxicology. 2007 Apr 11;232(3):248-56.

[9] Oishi S. Lack of spermatotoxic effects of methyl and ethyl esters of p-hydroxybenzoic acid in rats. Food and chemical toxicology. 2004 Nov 30;42(11):1845-9.

[10] Taxvig C, Vinggaard AM, Hass U, Axelstad M, Boberg J, Hansen PR, Frederiksen H, Nellemann C. Do parabens have the ability to interfere with steroidogenesis?. Toxicological sciences. 2008 Nov 1;106(1):206-13.

[11] Oishi S. Effects of butylparaben on the male reproductive system in rats. Toxicology and Industrial Health. 2001 Feb 1; 17(1): 31-9.

[12] Oishi S. Effects of butylparaben on the male reproductive system in rats. Toxicology and Industrial Health. 2001 Feb 1; 17(1): 31-9.

[13] Taxvig C, Vinggaard AM, Hass U, Axelstad M, Boberg J, Hansen PR, Frederiksen H, Nellemann C. Do parabens have the ability to interfere with steroidogenesis?. Toxicological sciences. 2008 Nov 1;106(1):206-13.

[14] Darbre PD., et a., Paraben esters: review of recent studies of endocrine toxicity, absorption, esterase and human exposure, and discussion of potential human health risks. Journal of Applied Toxicology, 2008.

[15] Ishiwatari S., et al., Effects of methyl paraben on skin keratinocytes. J. Appl. Toxicol, vol 27, pp 1-9.

[16] TEDX The Edocrine Disruption Exchange. List of Potential Endocrine Disruptors. Ethylparaben. 2016. Available online: http://endocrinedisruption.org/endocrine-disruption/tedx-list-of-potential-endocrine-disruptors/chemicalsearch?sname=&x=0&y=0&action=search&sall=1&searchfor=any&scas=120-47-8&searchcats=all (http://endocrinedisruption.org/endocrine-disruption/tedx-list-of-potential-endocrine-disruptors/chemicalsearch?sname=&x=0&y=0&action=search&sall=1&searchfor=any&scas=120-47-8&searchcats=all). Accessed April 22, 2022.

[17] Taxvig C, Vinggaard AM, Hass U, Axelstad M, Boberg J, Hansen PR, Frederiksen H, Nellemann C. Do parabens have the ability to interfere with steroidogenesis?. Toxicological sciences. 2008 Nov 1;106(1):206-13.

[18] Kawaguchi M., et al., Maternal isobutyl-paraben exposure decreased the plasma corticosterone level in dams and sensitivity to estrogen in female offspring rats. J. Vet. Med. Sci., vol. 71, no. 8, pp 1027-33, 2009.

[19] NTP (National Toxicology Program). 2014. Report on Carcinogens, Thirteenth Edition. Research Triangle Park, NC: U.S. Department of Health and Human Services, Public Health Service. Available online: http://ntp.niehs.nih.gov/pubhealth/roc/roc13/ (http://ntp.niehs.nih.gov/pubhealth/roc/roc13/). Accessed April 22, 2022.

[20] IARC Monographs on the Evaluation of Carcinogenic Risks to Humans: Chemical Agents and Related Occupations, Volume 100F, International Agency for Research on Cancer, 2012.

[21] EWG: Environmental Working Group. EWG's Skin Deep Cosmetic Database. DMDM Hydantoin (formaldehyde releaser). Available online: https://www.ewg.org/skindeep/ingredient/702196/DMDM_HYDANTOIN_(FORMALDEHYDE_RELEASER)/ (https://www.ewg.org/skindeep/ingredients/702196-DMDM_HYDANTOIN_(FORMALDEHYDE_%20RELEASER)/). Accessed April 22, 2022.

[22] Lv C, Hou J, Xie W, Cheng H. Investigation on formaldehyde release from preservatives in cosmetics. International journal of cosmetic science. 2015 Oct 1;37(5):474-8.

[23] Imidazolidinyl Urea. Available Online: http://www.ewg.org/skindeep/ingredient/703119/IMIDAZOLIDINYL_UREA_%28FORMALDEHYDE_RELEASER%29/ (https://www.ewg.org/skindeep/ingredients/703119-IMIDAZOLIDINYL_%20UREA_(FORMALDEHYDE_RELEASER)/). Accessed April 22, 2022.

[24] Becker, L. C., Bergfeld, W. F., Belsito, D. V., Klaassen, C. D., Hill, R., Leibler, D., ... & Andersen, F. A. (2010). Final report of the amended safety assessment of quaternium-15 as used in cosmetics. International journal of toxicology, 29(3 suppl), 98S-114S.

[25] Becker, L. C., Bergfeld, W. F., Belsito, D. V., Klaassen, C. D., Hill, R., Leibler, D., ... & Andersen, F. A. (2010). Final report of the amended safety assessment of quaternium-15 as used in cosmetics. International journal of toxicology, 29(3 suppl), 98S-114S.

[26] TEDX The Edocrine Disruption Exchange. List of Potential Endocrine Disruptors. Bronopol. 2016. Available online: http://endocrinedisruption.org/endocrine-disruption/tedx-list-of-potential-endocrine-disruptors/chemicalsearch?sname=bronopol&x=0&y=0&action=search&sall=1&searchfor=any&scas=&searchcats=all (http://endocrinedisruption.org/endocrine-disruption/tedx-list-of-potential-endocrine-disruptors/chemicalsearch?sname=bronopol&x=0&y=0&action=search&sall=1&searchfor=any&scas=&searchcats=all). Accessed April 22, 2022.

[27] ECHA: European Chemicals Agency. Substance information. Bronopol. Available online: https://echa.europa.eu/en/substance-information/-/substanceinfo/100.000.131#TRADE_NAMEScontainer (https://echa.europa.eu/en/substance-information/-/substanceinfo/100.000.131#TRADE_NAMEScontainer). Accessed

April 22, 2022.

[28] Haz-map. Bronopol. Available online: https://haz-map.com/Agents/1010 (https://haz-map.com/Agents/1010). Accessed April 22, 2022.

[29] Stejskal VD, Forsbeck M, Nilsson R. Lymphocyte transformation test for diagnosis of isothiazolinone allergy in man. Journal of investigative dermatology. 1990 May 31;94(6):798-802.

[30] De Groot A, Herxheimer A. Isothiazolinone preservative: cause of a continuing epidemic of cosmetic dermatitis. The Lancet. 1989 Feb 11;333(8633):314-6.

[31] Lundov, M. D., Krongaard, T., Menné, T. L., & Johansen, J. D. (2011). Methylisothiazolinone contact allergy: a review. British Journal of Dermatology, 165(6), 1178-1182.

[32] Rohm & Haas (2002). Acute Inhalation toxicity study in rate (methylisothiazolinone 53.52% active ingredient). Rohm & Haas Chemicals, LLC Report, 06R-1002.

[33] NIOSH: National Institute for Occupational Safety and Health. Methylchloroisothiazinone Guidelines. Accessed Online: https://www.cir-safety.org/sites/default/files/MI_MCI.pdf (https://www.cir-safety.org/sites/default/files/MI_MCI.pdf). Accessed April 22, 2022.

[34] Lundov, M. D., Krongaard, T., Menné, T. L., & Johansen, J. D. (2011). Methylisothiazolinone contact allergy: a review. British Journal of Dermatology, 165(6), 1178-1182.

[35] Burnett, C. L., Bergfeld, W. F., Belsito, D. V., Klaassen, C. D., Marks, J. G., Shank, R. C., ... & Andersen, F. A. (2010). Final report of the safety assessment of methylisothiazolinone. International journal of toxicology, 29(4 suppl), 187S-213S.

[36] Charles AK, Darbre PD. Oestrogenic activity of benzyl salicylate, benzyl benzoate and butylphenylmethylpropional (Lilial) in MCF7 human breast cancer cells in vitro. Journal of Applied Toxicology. 2009 Jul 1;29(5):422-34.

[37] NLM. Benzyl Benzoate. PubChem. Available online: https://pubchem.ncbi.nlm.nih.gov/compound/2345#section=Solubility (https://pubchem.ncbi.nlm.nih.gov/compound/2345#section=Solubility). Accessed April 22, 2022.

[38] Nair B. Final report on the safety assessment of Benzyl Alcohol, Benzoic Acid, and Sodium Benzoate. International journal of toxicology. 2000 Dec;20:23-50.

[39] CDC Pockeet Guide to Chemicals. NIOSH. Benzyl Alcohol. Available online: https://www.cdc.gov/niosh/npg/npgd0053.html (https://www.cdc.gov/niosh/npg/npgd0053.html). Accessed April 22, 2022.

[40] Purohit A, Kopferschmitt-Kubler MC, Moreau C, Popin E, Blaumeiser M, Pauli G. Quaternary ammonium compounds and occupational asthma. International archives of occupational and environmental health. 2000 Aug 1;73(6):423-7.

[41] CDC: Center for Disease Control and Prevention. NIOSH. Benzalkonium Chloride. Available online: https://www.cdc.gov/niosh/topics/asthma/exposures.html (https://www.cdc.gov/niosh/topics/asthma/exposures.html). Accessed April 22, 2022.

[42] NIH. National Library of Medicine. Citric Acid. Available online: https://pubchem.ncbi.nlm.nih.gov/compound/Citric-acid (https://pubchem.ncbi.nlm.nih.gov/compound/Citric-acid). Accessed April 22, 2022.

[43] Ricciardolo FL, Rado V, Fabbri LM, Sterk PJ, Di Maria GU, Geppetti P. Bronchoconstriction induced by citric acid inhalation in guinea pigs: role of tachykinins, bradykinin, and nitric oxide. American journal of respiratory and critical care medicine. 1999 Feb 1;159(2):557-62.

[44] HazMap. National Institute of Health. Citric Acid. Available online: https://haz-map.com/Agents/12560 (https://haz-map.com/Agents/12560). Accessed April 22, 2022.

[45] HazMap. National Institute of Health. Dehydroacetic acid. Available online: https://www.haz-map.com/Agents/4673 (https://www.haz-map.com/Agents/4673). Accessed April 22, 2022.

[46] Sakaguchi Y, Suga S, Oshida K, Miyamoto-Kuramitsu K, Ueda K, Miyamoto Y. Anticoagulant effect of sodium dehydroacetate (DHA-S) in rats. Journal of Applied Toxicology. 2008 May 1;28(4):524-9.

[47] California Proposition 65. Office of Environmental Health Hazard Assessment, 2015. Available online: http://oehha.ca.gov/prop65/prop65_list/Newlist.html (http://oehha.ca.gov/prop65/prop65_list/Newlist.html). Accessed April 22, 2022.

[48] National Toxicology Program. NTP Technical Report on the Toxicology and Carcinogenesis Studies of pulegone in F344/N Rats and B6C3F1 Mice. National Institute of Health, 2011. Available online: http://ntp.niehs.nih.gov/ntp/htdocs/lt_rpts/tr563.pdf (http://ntp.niehs.nih.gov/ntp/htdocs/lt_rpts/tr563.pdf). Accessed April 22, 2022.

[49] Henley D, Lipson N, Korach K, Bloch C. Prepubertal gynecomastia linked to lavender and tea tree oils. New England Journal of Medicine, vol. 356, pp 479-485, 2007.

[50] Dodson R, Nishioka M, Standley L, Perovich L, Brody J, Rudel R. Endocrine disruptors and asthma-associated chemicals in consumer products. Environ Health Perspect, vol. 120, no. 7, pp 935-943, 2012. Available online: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3404651/ (http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3404651/). Accessed April 22, 2022.

[51] NTP: National Toxicology Program. Report on Carcinogens, Fourteenth Edition. Methyleugenol. Available online: https://ntp.niehs.nih.gov/ntp/roc/content/profiles/methyleugenol.pdf (https://ntp.niehs.nih.gov/ntp/roc/content/profiles/methyleugenol.pdf). Accessed April 22, 2022.

[52] IARC: International Agency for Research on Cancer. Monographs. Methyleugenol. Available online: http://monographs.iarc.fr/ENG/Classification/ClassificationsAlphaOrder.pdf (http://monographs.iarc.fr/ENG/Classification/ClassificationsAlphaOrder.pdf). Accessed April 22, 2022.

[53] OEHHA: Office of Environmental Health Hazard Assessment. California Proposition 65 List of known carcinogens and reproductive toxicants. Methyleugenol. Available online: http://oehha.ca.gov/proposition-65/chemicals/methyleugenol (http://oehha.ca.gov/proposition-65/chemicals/methyleugenol). Accessed April 22, 2022.

[54] von Woedtke T, Schlüter B, Pflegel P, Lindequist U, Jülich WD. Aspects of the antimicrobial efficacy of grapefruit seed extract and its relation to preservative substances contained. Die Pharmazie. 1999 Jun;54(6):452-6.

[55] Takeoka G, Dao L, Wong RY, Lundin R, Mahoney N. Identification of benzethonium chloride in commercial grapefruit seed extracts. Journal of agricultural and food chemistry. 2001 Jul 16;49(7):3316-20.

[56] Goodman LS, Gilman A. The Pharmacological Basis of Therapeutics,(5thedn) McMillan Press. New York, USA. 1975.

[57] Budavari S. Marck Index: An Encyclopedia of Chemicals, Drugs and Biologicals: Encyclopedia of Chemicals Drugs and Biologicals. Merck & Company; 1989.

[58] CDC: Centers for Disease Control and Prevention. NIOSH. Lactic Acid. Available online: https://www.cdc.gov/niosh/npg/npgd0082.html (https://www.cdc.gov/niosh/npg/npgd0082.html). Accessed April 22, 2022.

[59] HazMap. National Institute of Health. Lactic Acid. Available online: https://haz-map.com/Agents/1416 (https://haz-map.com/Agents/1416). Accessed April 22, 2022.

[60] HazMap. National Institute of Health. Levulinic acid. Available online: https://haz-map.com/Agents/21110 (https://haz-map.com/Agents/21110). Accessed April 22, 2022.

[61] Bohn, S., & Bircher, A. J. (2001). Phenoxyethanol-induced urticaria. Allergy, 56(9), 922-923.

[62] Chasset, F., Soria, A., Moguelet, P., Mathian, A., Auger, Y., Francès, C., & Barete, S. (2015). Contact dermatitis due to ultrasound gel: A case report and published work review. The Journal of dermatology.

[63] Bohn, S., & Bircher, A. J. (2001). Phenoxyethanol-induced urticaria. Allergy, 56(9), 922-923

[64] HazMap. National Institute of Health. Potassium Sorbate. Available online: https://haz-map.com/Agents/6820 (https://haz-map.com/Agents/6820). Accessed April 22, 2022.

[65] Fisher AA. Cutaneous reactions to sorbic acid and potassium sorbate. Cutis. 1980 Apr;25(4):350-2.

[66] Sakaguchi Y, Suga S, Oshida K, Miyamoto-Kuramitsu K, Ueda K, Miyamoto Y. Anticoagulant effect of sodium dehydroacetate (DHA-S) in rats. Journal of Applied Toxicology. 2008 May 1;28(4):524-9.

[67] Nannini LJ, Hofer D. Effect of inhaled magnesium sulfate on sodium metabisulfite-induced bronchoconstriction in asthma. CHEST Journal. 1997 Apr 1;111(4):858-61.

[68] García-Gavín J, Parente J, Goossens A. Allergic contact dermatitis caused by sodium metabisulfite: a challenging allergen. A case series and literature review. Contact dermatitis. 2012 Nov 1;67(5):260-9.

[69] Madan V, Walker SL, Beck MH. Sodium metabisulfite allergy is common but is it relevant?. Contact Dermatitis. 2007 Sep 1;57(3):173-6.

[70] Bingham E, Cohrssen B, Powell CH. Patty's toxicology. Volume 2: toxicological issues related to metals, neurotoxicology and radiation metals and metal compounds. John Wiley and Sons; 2001.

[71] TEDX The Edocrine Disruption Exchange. List of Potential Endocrine Disruptors. Triclocarban. 2016. Available online: http://endocrinedisruption.org/endocrine-disruption/tedx-list-of-potential-endocrine-disruptors/chemicalsearch?sname=triclocarban&x=0&y=0&action=search&sall=1&searchfor=any&scas=&searchcats=all (http://endocrinedisruption.org/endocrine-disruption/tedx-list-of-potential-endocrine-disruptors/chemicalsearch?sname=triclocarban&x=0&y=0&action=search&sall=1&searchfor=any&scas=&searchcats=all). Accessed April 22, 2022.

[72] Chen J, Ahn KC, Gee NA, Ahmed MI, Duleba AJ, Zhao L, Gee SJ, Hammock BD, Lasley BL. Triclocarban enhances testosterone action: a new type of endocrine disruptor?. Endocrinology. 2008 Mar;149(3):1173-9.

[73] NIH: National Institute of Health. Haz-Map. Triclocarban. Available online: https://haz-map.com/Agents/8083 (https://haz-map.com/Agents/8083). Accessed April 22, 2022.

[74] Chen J, Ahn KC, Gee NA, Ahmed MI, Duleba AJ, Zhao L, Gee SJ, Hammock BD, and Lasley BL. "Triclocarban enhances testosterone action: a new type of endocrine disruptor?" Endocrinology. 2008 Mar;149(3):1173-9. Print.

[75] Huang H, Du G, Zhang W, Hu J, Wu D, Song L, Xia Y, and Wang X. "The in vitro estrogenic activities of triclosan and triclocarban." J Appl Toxicol. 2014 Sep;34(9):1060-7. Print.

[76] Zorrilla L, Gibson EK, Jeffay SC, Crofton KM, Setzer Wr, Cooper RL, and Stoker TE. "The effects of Triclosan on Puberty and Thyroid Hormones in Male Wistar Rats." 107(1) 56-64. Print.

[77] Ahn KC, Zhao B, Chen J, Cherednichenko G, Sanmarti E, Denison MS, Lasley B, Pessah IN, Kültz D, Chang DP, Gee SJ, Hammock BD. "In vitro biologic activities of the antimicrobials triclocarban, its analogs, and triclosan in bioassay screens: receptor-based bioassay screens." Environ Health Perspect. 2008 Sep;116(9):1203-10. Print.

[78] Heath R, Li J, Roland GE, and Rock CO. "Inhibition of Staphylococcus aureus NADPH-dependent enoyl-acyl carrier protein reductase by triclosan and hexachlorophene." Journal of Biological Chemistry. 275: 4654-9. Print.

[79] Aiello AE, Marshall B, Levy SB, Della-Latta P, Lin SX, and Larson E. "Antibacterial Cleaning Products and Drug Resistance." Emerging Infectious Diseases. 11(10): 1565–1570. Print.

[80] Chalew TE and Halden RU. "Environmental Exposure of Aquatic and Terrestrial Biota to Triclosan and Triclocarban." J Am Water Works Assoc. 2009;45(1):4-13. Print.

[81] Adolfsson-Erici M, Pettersson M, Parkkonen J, and Sturve J. "Triclosan, a commonly used bactericide found in human milk and in the aquatic environment in Sweden." Chemosphere. 46(9-10):1485-9. Print.

[82] Nitta Y, Kamiya K, Tanimoto M, Sadamoto S, Niwa O, Yokoro K. Induction of transplantable tumors by repeated subcutaneous injections of natural and synthetic vitamin E in mice and rats. Japanese journal of cancer research. 1991 May 1;82(5):511-7.

[83] Constantinides P, Harkey M. Initiation of a transplantable fibrosarcoma by the synergism of two non-initiators, alpha-tocopherol and soya oil. Virchows Archiv A. 1985 Sep 1;405(3):285-97.

[84] Klein EA, Thompson IM, Tangen CM, Crowley JJ, Lucia MS, Goodman PJ, Minasian LM, Ford LG, Parnes HL, Gaziano JM, Karp DD. Vitamin E and the risk of prostate cancer: the Selenium and Vitamin E Cancer Prevention Trial (SELECT). Jama. 2011 Oct 12;306(14):1549-56.

[85] Goka K. Embryotoxicity of zinc pyrithione, an antidandruff chemical, in fish. Environmental research. 1999 Jul 31;81(1):81-3.

[86] Scientific Committee on Cosmetic Products and Non-food Products. Opinion concerning a clarification on the formaldehyde and para-formaldehyde entry in Directive 76/768/EEC on cosmetic products. Opinion: European Commission. 2002. Available Online: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009R1223 (http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009R1223). Accessed April 22, 2022.

[87] Other uses of formaldehyde have different restrictions in Canada. Canada's Cosmetic Ingredient Hotlist Available Online: www.hc-sc.gc.ca/cps-spc/person/cosmet/info-ind-prof/_hot-list-critique/hotlist-liste_1-eng.php.

[88] Salvador A, Chisvert A, editors. Analysis of cosmetic products. Elsevier; 2011 Aug 11.

[89] Danish Ministry of the Environment-Environmental Protection Agency. Statutory order on restriction on import, sale and use of certain parabens in cosmetic products for children under 3 years. Available online: http://eng.mst.dk/media/mst/Attachments/Engelskparabenbekendtgrelse.pdf (http://eng.mst.dk/media/mst/Attachments/Engelskparabenbekendtgrelse.pdf). Accessed April 22, 2022.

[90] FDA: U.S. Food and Drug Administration. Parabens in Cosmetics. 2016. Available online: http://www.fda.gov/Cosmetics/ProductsIngredients/Ingredients/ucm128042.htm (http://www.fda.gov/Cosmetics/ProductsIngredients/Ingredients/ucm128042.htm). Accessed April 22, 2022.

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