Acrylates

Acrylates (ethyl acrylate, ethyl methacrylate, and methyl methacrylate) are ingredients found in artificial nail products. We are mainly exposed to these chemicals through inhalation or skin contact. Despite evidence of adverse skin, eye, and throat reactions to these chemicals, they continue to be used in nail products.

WHAT ARE ACRYLATES?

Acrylates are derived from acrylic acid and are commonly found in cosmetic nail preparations. Ethyl acrylate acts as an adhesive to apply artificial nails and eyelashes.[2][3] Ethyl methacrylate and methyl methacrylate allow sculptured artificial nails to mold and adhere to the natural nail plate.[4]

Direct contact and inhalation are the main hazardous forms of contact, and the Center for Disease CDirect contact and inhalation are the main hazardous forms of contact, and the Center for Disease Control and Prevention (CDC) warns that ethyl methacrylate and methyl methacrylate vapors may block air vents.[5][6][7][8] Proper ventilation in nail salons can reduce ethyl methacrylate levels by 90 percent.[9]

A little history:

In the early 1970s, methyl methacrylate was the primary monomer, or molecule, used in acrylic nails.[10] In response to consumer complaints of severe nail and skin reactions, the U.S. Food and Drug Administration concluded it was a "poisonous and deleterious substance" and decided to seize and recall nail products containing 100 percent liquid methyl methacrylate in 1974.[11] Ethyl methacrylate became and remains the main ingredient. In most artificial nail products, ethyl methacrylate makes up 90% of the products.[12] It is found in both professional products and home kits.[13][14]

Found In

- Artificial Nail Products (Acrylic Nails, Nail Enhancing Polishes)[1]

What to look for on the label

- Ethyl acrylate: Acrylic acid ethyl ester, ethyl propenoate, EA
- Ethyl methacrylate: ethyl methacrylate, ethyl ester, methacrylic acid, ethyl ester, ethyl 2-methyl-2-propenoate, EMA
- Methyl methacrylate: Methacrylate monomer, Methyl ester of methacrylic acid, methyl-2-methyl-2-propenoate, MMA

Health Concerns

Cancer: Government regulations and occupational studies have linked ethyl acrylate and methyl methacrylate to cancer. The International Agency of Research on Cancer (IARC) and U.S. Environmental Protection Agency (EPA) classify ethyl acrylate as a possible human carcinogen.[15][16]

Workers in acrylic sheet manufacturing exposed to both high and low levels of methyl methacrylate were at an increased risk of colorectal cancer.[17] Methyl methacrylate is a widely used adhesive in orthopedic and surgery material and equipment. Chronically exposed orthopedic surgeons had increased cancer mortality and younger age at death compared to less exposed general surgeons.[18]

Developmental and reproductive toxicity: Ethyl methacrylate and methyl methacrylate are linked to malformed skeletons and limbs in the offspring of exposed rats. Higher doses were linked to more malformations.[19] Male rat testosterone levels fluctuated after methyl methacrylate exposure, and the cells of the seminal vesicles (organs involved in semen production) were reduced in size and number.[20][21]

Organ-system toxicity: Organs throughout the body, but especially the respiratory system, are vulnerable to ethyl acrylate and methyl methacrylate.

Methyl methacrylate inhalation is associated with lung disease[22] and damage to nasal passages, liver, and kidneys.[23] Another study found lung damage and disease in rats after inhaling methyl methacrylate for 30 hours a week for 4 weeks.[24]

Ethyl acrylate is also toxic to the lungs, liver, kidneys, and gastrointestinal system.[25]

Cellular and Neurological Damage: All three chemicals damage cells and the genetic information contained in them.[26][27][28] They also stimulate cell death in mouse lymphoma cells.[29]

Furthermore, ethyl methacrylate interferes with cell communication in the brain and spinal cord of rats.[30] Studies showed that women and men with occupational exposure to methyl methacrylate presented symptoms of generalized and peripheral nerve damage.[31][32]

Irritation: All three chemicals are skin, eye, and respiratory tract irritants. Case studies of workers exposed to ethyl methacrylate and methyl methacrylate report workplace-induced asthma.[33][34][35][36][37][38] Repeated or prolonged contact with all three chemicals can result in skin sensitization, which is the possibility of developing a skin allergy to the chemical.[39][40][41]

Both receiving and applying acrylate-containing artificial nails have caused allergic contact dermatitis (ACD).[42][43] ACD damages and deforms nails and inflames skin on fingers, hands, eyelids, and face.[44] Once someone becomes sensitized to acrylates, it is incredibly difficult to effectively protect against exposure and, as a result, adverse reactions.

Artificial nail products contain a soup of these chemicals, which can lead to multiple allergies by cross-sensitizing and cross-reacting with each other.[45] Ethyl methacrylate and methyl methacrylate are especially strong sensitizers.[46] [47] Sensitization to one acrylic compound can increase sensitivity to one or more other acrylates and exacerbate allergic reactions.[48][49] Re-exposure to these chemicals in other settings, such as during dental surgery, can trigger allergic reactions.[50]

Vulnerable Populations

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

Regulations

Although the Food and Drug Administration banned 100 percent liquid methyl methacrylate in 1974, no specific regulations prohibit its use at concentrations lower than 100 percent in cosmetic products.[51] Across the United States, at least 32 states ban the professional use of methyl methacrylate in nail salons.[52] Still, the FDA found trace amounts in 15 to 25 random samples of the chemical in powdered form and reports that it continues to be found in artificial nail products.[53][54] Air samples from 12 randomly selected nail salons in Salt Lake City County in Utah, which banned methyl methacrylate, found 58 percent of the salons had methyl methacrylate circulating in the air.[55] Considering the corrosive and skin sensitizing properties of ethyl methacrylate and methyl methacrylate, the Methacrylate Producers Association, Inc. has stated that these chemicals are not appropriate for artificial nail products.[56] Yet, they continue to be ingredients.[57]

How to Avoid?

Avoid using artificial nails unless you know that they do not contain acrylates. Nail technicians should use ventilated manicure tables and wear appropriate safety masks and protective gloves. The Occupational Safety and Health Administration recommends NIOSH-approved filtering face piece respirators (e.g. dust masks) and nitrile gloves .[58]

Explore other Chemicals

Ethanolamine Compounds (MEA, DEA, TEA And Others) (https://www.safecosmetics.org/chemicals/ethanolamine-compounds/)

Parabens (https://www.safecosmetics.org/chemicals/parabens/)

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

Triclosan (https://www.safecosmetics.org/chemicals/triclosan/)

Polytetrafluoroethylene (PTFE, Aka Teflon®) (https://www.safecosmetics.org/chemicals/polytetrafluoroethylene/)

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

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