# Synthetic Musks

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Synthetic musks are chemicals used in personal care product fragrances. They are rarely listed on the label, since fragrance ingredients are often not disclosed. Synthetic musks bioaccumulate in the environment and have been detected in human breast milk, body fat, blood, and umbilical cords. Studies show that these compounds can disrupt cell functioning and hormone systems.

# WHAT ARE SYNTHETIC MUSKS?

Synthetic musks are used as fragrance ingredients in personal care and cleaning products. The most common types of musks used in consumer products are nitro-musks (e.g., musk ketone and musk xylene) and polycyclic musks (e.g., galaxolide and tonalide). These chemicals enter the human body through skin absorption, inhalation, and ingestion of foods such as fish that are exposed to these chemicals.[1]

Global polycyclic musk production is approximately 1 million pounds per year.[2] Randomly sampling personal care products showed 80% contained at least one synthetic musk.[3],[4] Frequent use of musk-containing products corresponds to greater accumulation of these chemicals in the body and the environment.[5],[6],[7]

## Found In

- Perfumes
- Colognes
- Scented soap, body wash, sprays, lotions, hair products, detergents, softeners

## What to look for on the label

- Fragrance
- Musk ketone
- Musk xylene
- Galaxolide
- Tonalide

# Health Concerns

**Endocrine disruption:** There is evidence that synthetic musks disrupt hormones. Musk ketone,[8],[9] galaxolide,[10],[11],[12] and tonalide[13] alter estrogen activity, and both tonalide and galaxolide inhibit androgen and progesterone from binding to their

receptors.[14],[15] Musk ketone, musk xylene, and tonalide have also increased the growth and multiplication of estrogen-responsive human breast cancer cells.[16]

**Organ system toxicity:** Galaxolide and tonalide are toxic to brain and lung cells,[17] and evidence suggests tonalide damages liver cells.[18]

**Reproductive and developmental toxicity:** High levels of musk xylene and musk ketone in women's blood may be associated with gynecological abnormalities such as ovarian failure and infertility.[19], [20] In embryonic cells, tonalide altered activity in nearly 3,000 genes, some of which are directly involved in development.[21] Galaxolide, tonalide, and musk ketone strongly inhibited larval development in plankton.[22]

**Bioaccumulation:** Because synthetic musks bioaccumulate and are only partially biodegradable, they are dispersed throughout our environment. Musk chemicals contaminate water, wastewater sludge, drinking water, soil, indoor air, and living species.[23],[24] These chemicals are toxic to a variety of aquatic organisms and have been found in commonly consumed seafood such as salmon and shrimp.[25],[26]

Synthetic musks have been detected in household dust and barbershop air.[27] Due to their ubiquity and potential to accumulate, synthetic musks are pervasive in peoples' bodies. Musks are present in umbilical cord blood, placenta,[28],[29] and women's breast milk, blood, and fat tissue from around the world including the United States,[30], [31] China,[32],[33] Korea,[34],[35] and Germany. [36],[37] Women over 50 years of age had higher levels of galaxolide and musk xylene compared to women under 50 years old. [38]

These chemicals were found in adults, college students, and toddlers, with toddlers having higher daily exposure levels than adults.[39]

## Vulnerable Populations

Pregnant Women (https://www.safecosmetics.org/population/pregnant-women/), Teenagers (https://www.safecosmetics.org/population/teenagers/), Women of Color (https://www.safecosmetics.org/population/women-of-color/)

## Regulations

Environmental concerns motivated Japan to ban musk xylene and other nitro-musks in the 1980s.[40] In line with the global International Fragrance Association (IFRA) standards, the European Commission banned musk xylene,[41],[42] while musk ketone and tonalide are restricted.[43],[44] The United States does not restrict their use.

## How to Avoid?

Avoid personal care and cleaning products containing synthetic fragrances (body sprays, colognes, air fresheners).

### Explore other Chemicals

**Methylisothiazolinone and Methylchloroisothiazolinone (https://www.safecosmetics.org/chemicals/methylisothiazolinone/)**

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

**Nitrosamines (https://www.safecosmetics.org/chemicals/nitrosamines/)**

**Resorcinol (https://www.safecosmetics.org/chemicals/resorcinol/)**

**P-Phenylenediamine (https://www.safecosmetics.org/chemicals/p-phenylenediamine/)**

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