

# Musk Aroma Chemical Industry

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**S**evere restrictions on the use of nitro musk ambrette are visible shifting worldwide production from nitro musks to polycyclic musks.

The imminent expiration of critical patents on IFF's Galaxolide will result in increased competition in the U.S. polycyclic musk market.

These are two observations from a recent in-depth study on the worldwide synthetic musk aroma chemical market which consolidates data on production, consumption, import/export and price trends to 1995.

In this article we highlight some of the overall findings from the study which we believe is the first to be done on this branch of the fragrance industry. For further details, including specific data on producer/consumer countries and companies, the reader is referred to the complete study.

## Uses for Musk

With a sophisticated and long-lasting odor, musk aroma chemicals are used extensively in soaps, detergents and fine fragrances.

While musk aroma chemicals account for only about 5% of the total volume of the fragrance industry, because of their relatively high price, they contribute a healthy 10% of its monetary value. Up to 50% of synthetic musk aroma chemicals are used internally by the manufacturers in fragrance compounds. Not surprisingly, musk aromas are bought and sold to competitor producers and blenders; roughly 30% of total sales are to the competition.

## Origins of Musk

Highly valued for its thick, oily, jelly-like natural musk, the musk deer is the most desired, although untamed animal of Tibet and Siberia. Both male and female deer have a musk gland (pod) under the tail; the adult male also has a pouch on the abdomen. Each musk pod contains about an ounce of liquid. When the musk is first extracted from the deer, it has overwhelming odor, but as it dries the scent develops into a pleasant one. At first the color is red but, as it dries, turns black from oxidation. The Tibetan oriental musk is more valuable than its Siberian neighbor. Musk deer are still hunted for their musk, but not as much as in the past.

The phenomenal growth demand for musk has created a worldwide synthetic musk industry, which has led to a decreasing need for the naturally-occurring musk. With high-tech processes and increasingly sophisticated fragrance laboratories, synthetic musks are now extremely comparable to the natural varieties. Recent literature refers to the use of biotechnology in some stages of synthetic musk production.<sup>1</sup>

## Nitro, Polycyclic and Macrocyclic Production

Nitro musks which currently constitute a 35% share of the worldwide production volume of about 7000 metric tons per year have decreased in production rate by approximately 5% annually since 1983. This decline in nitro musk output has led to a 5% annual rise in polycyclic musk pro-

duction. Polycyclics currently hold about a 61% share of the musk market. Because of their high value, macrocyclic musks will maintain only a 3-4% share of the total synthetic musk market into the mid 1990s. It is projected that the synthetic musk aroma chemical overall volume will rise at the annual GNP rate through 1995.

The projected decline in nitro musk production is based on findings of the Research Institute of Fragrance Materials in Englewood Cliffs, New Jersey, which recommended imposition of severe restrictions on the use and applications of nitro musk ambrette based on musk ambrette's photosensitivity to some persons when used in after-shave lotions. Further studies indicate that musk ambrette may be neurotoxic and mutagenic.

Other nitro musks (xylol, ketone, moskene, tibetine) have been under extensive testing, but show no indications of harm when used in fragrance materials.

### Producing Areas

In 1987, ten countries produced slightly more than 7000 metric tons of nitro, polycyclic and macrocyclic musk aroma chemicals. The United Kingdom is responsible for 28% of the total, worldwide, and ranks as the number one producing country. Israel, the smallest producer, makes about 100 metric tons of polycyclic musk.

Musk demand in the United States exceeds domestic production by 100%. Almost 60% of the value consumed is imported. The U.S. imports approximately 40% of its nitro musk from mainland China.

Most musk is produced in Western Europe where capacity exceeds demand by about 25%. Since the U.S. is a big consumer, there may be a shift from production in Europe to the United States since the U.S. dollar has experienced a continued decline. Japan, a big consumer which also makes polycyclic and macrocyclic musks, has plans to enter the U.S. market with large volumes in 1988.

A major producing country of nitro musk, China is introducing polycyclic musk to compensate for the diminishing sales of some nitro musks worldwide. Until recently, China and India produced nitro musks only.

Australia, a big continent with a small but affluent population, imports all of its musk chemicals. Limited production of polycyclics may become quite attractive there to reduce dependence on imports of musks or compounded fragrances.

### Market Value of the Musk Industry

In 1987, the worldwide synthetic musk market is valued at \$215 million and is expected to increase to about \$240 million in 1990 and \$280 million in 1995. The U.S. market is valued at about \$60 million. (All values are based on 1987 dollars.) Because the lower value nitro musks are being replaced by higher cost polycyclic and macrocyclic musks, the market value of musks is rising faster than the production volume.

### Acknowledgement

This article is based on information from a recent survey (1986-1987) on the worldwide synthetic musk aroma chemicals market by Eldib Engineering & Research, Inc., conducted under the auspices of I. A. Eldib, PhD, founder of the 25-year-old chemical marketing research firm.

The complete study on musk aroma chemicals is available from Eldib Engineering & Research, Inc., 613 Springfield Avenue, Berkeley Heights, NJ 07922, telephone 201/464-2244, telex 642936.

### References:

1. Akira Iwaka, "Manufacturing of macrocyclic musk compounds from long-chain dicarboxylic acids", *Fragrance Journal*, (Japan) 15(4), pp 161-3, 1987

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**Left to right, Michele Brubaker (Roure), John Mastracola (Fritzsche Dodge & Olcott); and Dwight Loren (Roure) at the American Society of Perfumers 34th Annual Symposium Post Reception.**

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