

## NITROSAMINE/NITROSATABLE FREE LATEX PRODUCTS: CHALLENGES IN PRODUCTION AND TESTING

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The first step in the production of safe latex products is to get latex having low nitrosamine/nitrosatables. The design of the curative system with sulphur and a combination of safe accelerators along with zinc oxide is the key factor for the production of latex articles which can be categorized under safe category. In this study, the effect of different latex concentrates, formulations and processes on the final nitrosamine content of the product was analyzed. The variations in results from laboratory to laboratory for this critical test are also discussed.

**Key words:** Latex products, Nitrosamines, Nitrosatables, Nitrosating agents, Secondary amines

Nitrosamines are an extremely common group of chemicals, which are naturally abundant in the environment. They can be found in many processed foods, such as fried bacon, cured meat and fish, sausages, cheese, pickled vegetables, beer, tobacco, certain cosmetics and most rubber products (made out of both NR latex and dry rubber, as well as both natural and synthetic rubber). Nitrosamines are produced in the reactions between secondary amines and nitrous acid/nitrosatable substances (NOX). Secondary amines are extremely common in the aforesaid products, and nitrous acid is present in the atmosphere. Therefore, none of the above products deliberately set out to produce nitrosamines - they are the by-products of either the manufacturing process or the subsequent storage condition of the products. Nitrosamines are considered to

be carcinogenic, although direct evidence of this is limited. Many of the compounds within the nitrosamine groups have been shown to produce various cancers in many laboratory animals. Accordingly, it is well accepted that there must be minimum exposure of humans to nitrosamines.

In general, nitrosatables are not toxic to humans or laboratory animals. However, as mentioned before, they are capable of unintentionally producing nitrosamines, which are toxic. Table 1 provides the details on nitrosating agents and origin of the same (Williams, 1988). The relationship between nitrosatables and nitrosamines can be defined by the equation: nitrosatables (secondary amines) + nitrous acid  $\Rightarrow$  nitrosamines. It is known that some nitrosatables present in rubber products can be converted into nitrosamines during