CLEARING THE AIR ON MOSH & MOAH

BY ANDRE ADAM

Recently, many publications have run articles, often copies of one another, drawing attention to oil found in food. Eventually, the focus was placed on mineral oil and the terms MOSH (mineral oil saturated hydrocarbons) and MOAH (mineral oil aromatic hydrocarbons) entered the lexicon.

We can safely assume that no one in the public or at nongovernmental organizations understood what these terms meant. Nonetheless, MOSH and MOAH soon were deemed to be threats to human health. Moreover, because these compounds were detected in products often given to children, like breakfast cereals and chocolate, emotions fueled concern about the issue.

The immediate result was serious commercial damage to the producers of the affected products as sales plummeted. Commonly voiced concerns were that MOAH could potentially cause cancer and that MOSH was linked to liver damage. These kinds of warnings always command a lot of attention and are spread by many consumer organizations, resulting in an immediate reaction from state bodies responsible for human health. The facts seem to be of lesser importance to observers because the burden of proof lies with industry, which must allay public concerns by explaining complex scientific studies.

Effects on Food Lubes

Concerns over MOSH and MOAH have recently spread to the use of high-quality lubricants specially designed for the food industry. These products are generally known as food grade lubricants, but are more accurately defined as "lubricants for incidental food contact - H1."

Suppliers of these lubricants have been confronted with requests from their customers to supply lubricants free of MOSH and MOAH. To start with the conclusion: This is not possible. Simply put, it is not possible to make a mineral oil based lubricant free of both MOSH and MOAH, just as it is not possible to make fat-free bacon.

Just looking at recent publications would seem to indicate that the industry has a serious problem. Fortunately, CONCAWE (CONservation of Clean Air and Water in Europe) has been very active in analyzing the issue. It has invested a significant amount of time and money conducting a great deal of testing to understand the issues involved.

Also, a thorough two-year data

search was done of the archived material, including studies and samples spanning more than 30 years. The search was compounded by the fact that data were spread over numerous sites in Europe and the United States and needed to be consolidated. A great deal of work was done by Juan-Carlos Carrillo, a senior Shell toxicologist and chairman of the MOCRINIS (mineral oil cross industry issue) working group, with strong support from CONCAWE.

In a presentation at the ICIS/ELGI Industrial Lubricants Conference in 2014, Carillo said, "MOSH and MOAH are misleading terms because apart from mineral oil, there are other sources of hydrocarbons contributing to the overall MOSH/MOAH makeup." He added that no analytical method can distinguish the actual sources of hydrocarbons; it can only reflect the sum total of all hydrocarbon sources contributing to the MOSH/MOAH fractions of a sample. He contended that regulations should be based on unambiguous technical terminology and a defined analytical method.

MOAH & MOSH Simplified

To understand the terms involved, it is helpful to remember that many years ago, we learned that cholesterol was very bad, until scientists discovered that there are more types of cholesterol, both good and bad. The recently concluded studies show a similar result for MOAH – there are good MOAH and bad MOAH.

The good news is that all the bad MOAH, containing three or more polycyclic aromatic compounds, are removed from oil by the severe refining process it undergoes. These higher numbered rings are indeed material you do not want in or on your body.

MOAH with one or two polycyclic aromatic compound rings do not pose a risk due to their structures. This fact has been proven in toxicology studies and carcinogenicity tests.

However, if food is tested for the presence of MOAH without prior knowledge, these lower number rings will be detected. And simply assuming this MOAH to be the bad form will create a great deal of concern.

The point is that none of the bad MOAH is present in food lubricants. However, food may, in fact, be contaminated with bad MOAH, but this is caused not by the lubricant but rather by poor industrial hygiene practices during manufacturing or transport. Contamination with used motor oil is an example.

MOSH is and has been present in food lubricants and always will be. Further, MOSH-containing products used for food production have been tested for adverse effects on human

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health and have received a clean bill of health from the doctors.

When foodstuffs are found to contain MOSH, the source can be the lubricants, mold release agents, food additives, the environment, etc. It is impossible to trace the original source of such contamination, and the underlying question must be: What is the source of the problem?

What's the Use?

A distinction must also be made between the two main reasons why food grade lubricants are used. Some lubricants are made of technical white oils, and their main use is the lubrication of food producing equipment. These products are generally called H1 lubricants, approved for incidental food contact. As such, these lubricants should not be part of the food and should not come in contact with food. If they do, the food should be disposed of.

Of course, these products have been formulated with components that have been approved for their use and are safe. If a small leak occurs, it should not pose a risk for consumers. For that reason, the U.S. Food and Drug Administration has set an upper limit of 10 parts per million. Technical white oil per se is not dangerous, but it does not meet the technical specifications to be regarded as an oil allowed to come into direct food contact.

Lubricants for direct food contact are generally known as 3H, a category for food additives and, among others, mold release agents. These products are made from medicinal white oils and do contain MOSH and MOAH. The key point here is that the FDA has specified clearly defined limits on the amount of 3H lubricant that can be used.

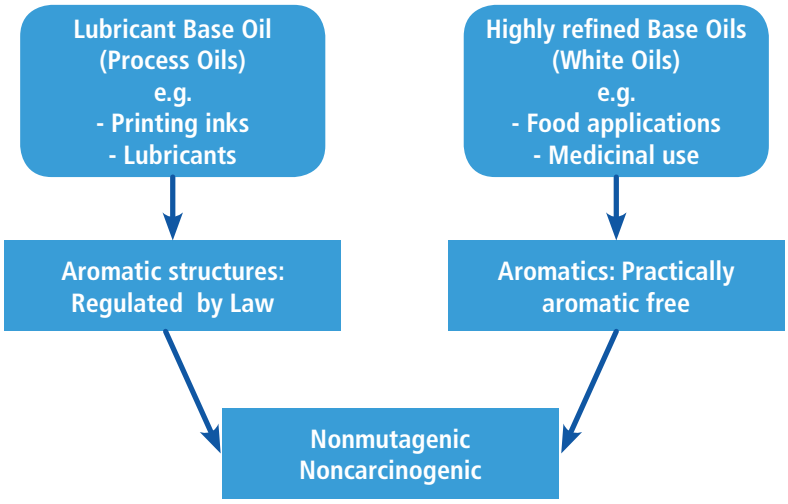
The European Food Safety Authority has also defined very strict limits and has established three categories – Class 1, 2 and 3. The maximum acceptable daily intake for Class 1 products is 12 milligrams per kilogram body weight.

The most important point to be aware of is that the viscosity of the product is critical. The larger the molecule, the higher the viscosity and the lesser the concern. This means that a product with a viscosity of 100 centistokes has a much higher acceptable daily intake than a product with a viscosity of 68 cSt.

Therefore, any analysis by a concerned party should examine not only the total amount of MOSH, but also the size of the molecules to determine if there is a risk or even a violation of the law. Apparently, this practice was not followed in the various consumer tests; therefore, concerns were raised for the wrong reason.

The MOSH concern over liver toxicity is linked to the low-viscosity oils (Class 2 and 3), which are prohibited in 3H applications. As a side note, the liver effects linked to these oils were seen in only one type of rat, which differs greatly from all other animals and humans. More and more toxicologists share the opinion that this result may well be a false positive and that the liver effects are peculiar to this type of rat and not relevant for humans.

Mineral Oils According to CONCAWE



Source: Shell International b.v.

Conclusion

All products will contain MOSH and MOAH, but food-grade lubricants, provided they are made the way they were registered at INS or NSF, are safe. There is a difference in the way the 3H category is interpreted, with the European Food Safety Authority preferring the use of large, high-viscosity molecules. Finally, there is a need for better education of NGOs and governmental bodies regarding MOSH and MOAH. □

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