Information paper „Mineral oil in Food Products“

Lubricants in industrial production secure smooth and long-lasting use during operation of machinery and equipment. They are designed to reduce friction and wear, protect against corrosion and prevent contamination of lubricating points. Mineral oils have proven for the production of lubricants over decades.

In the press there have been several publications dealing with “mineral oil in food products”, where consumer organisations requested manufacturers to warrant a zero-tolerance of mineral oil residues (hydrocarbons) in their food products[1].

This is not possible according to the Bund für Lebensmittelrecht und Lebensmittelkunde e. V. (BLL) – (German Federation for Food Law and Food Science), as nowadays there are environmental burden to a high degree, caused by exhaust gases and other emissions. Mixtures of mineral oil based substances are considered “ubiquitous”, i. e. present everywhere in small dosages[2]. Even BfR (Bundesinstitut für Risikobewertung = Federal Institute for Risk Assessment) does not request a zero tolerance therefore[3].

The European Commission has in January 2017 articulated a recommendation[4] (on the monitoring of mineral oil hydrocarbons in food and materials and articles intended to come into contact with food), to monitor mineral oil residues in food and articles which are meant to get in contact with food. In this context two mineral oil components (hydrocarbons) are explicitly mentioned:

- **MOSH**: non aromatic / saturated hydrocarbon molecules / mineral oil components (**M**ineral **O**il **S**aturated **H**ydrocarbons)
- **MOAH**: aromatic hydrocarbon molecules / mineral oil components (**M**ineral **O**il **A**romatic **H**ydrocarbons)

It has to be considered however, that MOSH and MOAH are not synonymous with a toxicological characterization of mineral oil based lubricants, as these types will also be found when analyzing e. g. vegetable oils.

Assessment of the health risk of MOSH and MOAH (e. g. by the legislative body and organisations like EFSA, FDA, CONCAWE, consumer organisations etc.):

Aromatic hydrocarbon (MOAH) are captured as cumulative values and contain constituents of (non alcylated) „polycyclic aromatic hydrocarbons“ (PAC) with 3-7 rings as well as highly alcylated aromatic hydrocarbons – mostly with 1-2 rings. PAC with 3-7 rings are considered critical as they are suspected to be carcinogenic. During the refining process polycyclic aromatic hydrocarbons with 3-7 rings will be removed. The remaining highly alcylated aromates – mostly with 1-2 rings are considered little critical[5].

Some MOSH however may explicitly be used in products for the pharmaceutical or food and luxury foods industry. A prominent example are e. g. paraffins (also MOSH) in lip care products, provided they meet the Colipa recommendation[6].

Uncritical are acoording the European Food Safety Authority (EFSA) amounts of less than 19 mg MOSH per kg body weight[7].The highest amount of MOSH found in packed food was 32 mg MOSH/kg in pudding. An adult would therefore need to eat daily abt. 43 kg pudding to reach the threshold. In bread and rice (bulk) up to 261 mg/kg have been found, i. e. about 5 kg bread are enough to reach the maximum allowable dosage[7].

Lubricants, which may have (incidentally) contact with food are designated H1 lubricants or lubricants according to ISO 21469, depending against which standard they have been

produced. Both standards are generally recognised for food safety, even though should traces of lubricants end up in food.

There is no standard or code for **lubricants** for **intended use in food** in Europe. Lubricants must under no circumstances be brought in contact with food intentionally.

So called “3H” products are considered “release agents” (with food contact) and are not subject of this paper.

Where are MOSH or MOAH present?

- Oil made of crude oil or gas and coal liquefaction respectively, bio mass contains aromatic (MOAH) and non aromatic hydrocarbons (MOSH). During the refining process MOAH will be removed or chemically converted to a great extent. Depending on the severity level of the refining process PAC will be present only in traces (ppm- or ppb-level respectively).
- Technical white oil contains almost exclusively non aromatic saturated hydrocarbons (MOSH). Sporadically aromatic hydrocarbons can be present to some extent. Therefore they are considered MOSH, with little fractions of MOAH.
- Medical white oil and white oil for food and luxury foodstuff is a highly refined mineral oil which does not contain polycyclic aromatic hydrocarbons with 3-7 rings. Such oils have been tested and monitored on potential carcinogenic effects over decades.

White oils are approved by the globally leading American authority “Food and Drug Administration” (FDA) and may be used as components in lubricants (so-called “H1” list[9]). The use of approved white oils is permitted for the production of lubricants for the food and luxury foods processing industry.

The presence of MOSH does not automaticllly lead to the conclusion that MOAH are present. But even the presence of MOAH itself is not an indcation for a carcinogenic potential, this is depending on the structure and number of rings of the aromatic componenets.

Even if MOAH will be detected in food the source cannot be associated with the lubricant automatically. In many cases such impuritiesare are not caused by the use of an approved “H1” or “ISO 21469” lubricant.

Migration of MOAH from contaminated packaging material, which had been made of (recycled) used paper. Aromatic hydrocarbons end up in food most likely only after the production process and are captured as MOAH. They stem from packages made of recycled paper.

Further sources of possible ingress of hydrocarbons into food products can be e. g. lubricant losses from agricultural equipment. Hydrocarbons can also be entered by general pollution along the entire food production chain, as in many regions (e. g. great sections of Africa and Asia) there is no equivalent legislation to protect food. Hydrocarbons can also be entered from emissions (vehicles, industry) or can be even natural constituents of food components.

Further potential sources can be the carrier fluids for supplements and addives, which should be analysed for their potential prior to any respective use.

[1] https://www.foodwatch.org/de/informieren/mineraloel/mehr-zum-thema/ , aufgerufen am 8.6.2017

[2] https://www.bll.de/de/der-bll/positionen/bll-stellungnahme-sachstand-mineraloel , aufgerufen am 8.6.2017

[3] http://www.bfr.bund.de/de/fragen_und_antworten_zu_mineraloelbestandteilen_in_schokolade_aus_adventskalendern_und_anderen_lebensmitteln-132213.html, aufgerufen am 8.6.2017

[4] http://eur-lex.europa.eu/legal-content/DE/TXT/?uri=CELEX%3A32017H0084
EMPFEHLUNG (EU) 2017/84 DER KOMMISSION vom 16. Januar 2017 über die Überwachung von Mineralölkohlenwasserstoffen in Lebensmitteln und Materialien und Gegenständen die dazu bestimmt sind, mit Lebensmitteln in Berührung zu kommen.

[5] Agarwal et al., 1988; 2 Doak et al.,1985

[6] COLIPA-Empfehlung Nr. 14 vom 26. April 2004 (Dachverband der Europäischen Kosmetikindustrie, Brüssel; www.colipa.com; www.cosmeticseurope.eu)

[7] EFSA Journal 2012, 10(6), 2704

[8] Marco Binaglia, EFSA Mocrinis Workshop, Bologna, September 2013

[9] http://info.nsf.org/USDA/Listings.asp

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