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National Organic Standards Board
USDA-AMS-NOP
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Docket ID # AMS-NOP-24-0081

Re. LS: Iodine annotation

These comments to the National Organic Standards Board (NOSB) on its Spring 2025 agenda are submitted on behalf of Beyond Pesticides. Founded in 1981 as a national, grassroots, membership organization that represents community-based organizations and a range of people seeking to bridge the interests of consumers, farmers, and farmworkers, Beyond Pesticides advances improved protections from pesticides and alternative pest management strategies that eliminate a reliance on pesticides. Our membership and network span the 50 states and the world.

Iodine is frequently formulated as iodophors—with surfactants or complexing agents. Iodophors may contain nonylphenols (NPs) and nonylphenol ethoxylates (NPEs), as well as other alkylphenols (APs) and alkylphenol ethoxylates (APEs). are strong endocrine disruptors with impacts on many species, including gender changes. Breakdown of certain APEs may lead to toxic effects in treated livestock and applicators. Organic alternatives include ethanol or essential oils for some uses. Other natural alternatives identified by the TR include udder washes containing essential oils, vinegar, natural acids, nisin for teat dips, and natural ethanol. Other substitutes include chlorhexidine, alcohols, hydrogen peroxide, essential oils, and other chlorine materials. EPA has approved the following for use in Design for the Environment disinfectant products: citric acid, hydrogen peroxide, l-lactic acid, ethanol, and isopropanol. Some disinfectant TRs identify some alternative practices for some uses–steam sterilization and UV radiation. The iodine TR says, "The risk of mastitis incidents is significantly reduced when producers maintain a clean and dry environment for the animals. Frequently changing the animal's bedding material and/or using inorganic bedding (i.e., sand) may also reduce environmental contamination with these bacteria. In addition, providing a healthy, balanced diet to the animal and ensuring the cleanliness of milking implements are important steps for maintaining health udders."

The LS has scaled back its original proposal to prohibit APEs to one that prohibits only NPEs. We believe it is important to add an annotation to prohibit the use of APEs and APs in organic production; APEs are suspected endocrine disruptors and proven aquatic toxicants.

The Danish Environmental Protection Agency published a review of APEs and APs which provides useful information on the larger group.[1] We quote from that publication in order to clarify the application of the class:

> An alkylphenol is a phenol derivative wherein one or more of the ring hydrogens have been replaced by one or more alkyl groups. An alkyl group is a functional group or side-chain that consists solely of single-bonded carbon and hydrogen atoms. A wide variety of alkylphenol structures are possible, but many are not commercially important. Alkylphenols of the greatest commercial importance have alkyl groups ranging in size from one (methyl) to twelve carbons (dodecyl) (Kirk Othmer, 2003). The alkylphenols are often named after their chain length e.g. nonylphenol (9 carbon atoms) and dodecylphenol (12 carbon atoms).
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> It is common to consider the group synonymous with nonylphenol and nonylphenol ethoxylates and other AP/APOE with similar application patterns without a more precise definition. As an example the "alkylphenol and alkylphenol ethoxylates" are mentioned collectively in criteria documents for the Nordic Swan and the EU Flower ecolabels, but the substance group is not defined in the documents and apparently not in any of the background documents.
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> The European Council for Alkylphenols and Derivatives, CEPAD, represents companies which manufacture a variety of alkylphenols ranging from butylphenols with a chain length of 4 to the dodecylphenol and derivatives with a chain length of 12.
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> **Cresols and xylenols**
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> The substances with the shortest chain length, i.e. with only one or two methyl groups, are most often designated as cresols (o-, p- and m-isomers) and xylenols, respectively (a methyl group has one carbon atom only and three hydrogen atoms). They differ significantly in their chemistry, toxicity and application pattern from the longer chained alkylphenols. The cresols and xylenols are not considered as potential alternatives to the longer-chained alkylphenols, and the environmental and health issues associated with these substances are different from the issues relevant for the longer chained AP. Both cresol and xylenol have a harmonised classification as acute toxic. It is common not to consider the methylphenols as part of the "alkylphenols" group. As an example, Ullmann's Encyclopedia of Industrial Chemistry lists 82 CAS numbers in the chapter on alkylphenols, but has separate chapters on the methylphenols. Moreover, these substances do not have similar use patterns compared to the substances mentioned as examples in LOUS. Cresols are mainly used as solvents and xylenols as pesticides. [p.19.]
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> As described in previous chapters, alkylphenols are a group of chemicals comprising a substantial number of substances ranging from cresol (C1-alkylphenol) to phenols with up to four linear or branched constituent groups of varying chain lengths. However, the ethoxylated versions of alkylphenols of any commercial significance (detergents, emulsifiers) are in reality limited to C8-, C9- and C12-compounds with a few C4- C7-compounds being possible future substitutes for some of the long-chain alkylphenols.
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> C1-, C2- and C3-alkylphenols are, contrary to the long chain alkylphenols, typically ready biodegradable and only moderately toxic in the environment, as e.g. reflected by their lack of

[1] Danish Ministry of the Environment, 2013. Survey of alkylphenols and alkylphenol ethoxylates. https://www2.mst.dk/Udgiv/publications/2013/04/978-87-92903-99-0.pdf.

environmental classification by notifiers (see Annex 3). They are also different from the long-chain alkylphenols with regard to other properties and their technical uses; therefore, they are not included in the following environmental review. The emphasis of the review will be on the important C8-, C9- and C12-alkylphenols and their ethoxylates together with examples of possible technical alternatives among the C4-to C7-alkylphenols. [p.85.]

Like the Danish Environmental Protection Agency, we focus on octylphenol, nonylphenol, and dodecylphenol and their ethoxylates. In these comments, we use "alkylphenol" or "AP" to refer to octylphenol, nonylphenol, and dodecylphenol. APEs degrade to products, including APs, that are more toxic, more lipophilic, more estrogenic, and more persistent than the parent substances.[2] Bacteria help break down APEs to APs and other more toxic chemicals. In aerobic systems, more carboxylic acid compounds are produced.[3]

EPA summarizes fate and aquatic toxicity for nonylphenol and octylphenol ethoxylates (NPEs and OPEs) as persistent and toxic, with more toxic degradates.[4] APs and APEs bind to the estrogen receptor resulting in the expression of several responses both in vitro and in vivo, including the induction of vitellogenin. The threshold for vitellogenin induction in fish is 10 ug/L for NP and 3 ug/L for OP. APEs also affect the growth of testes, alter normal steroid metabolism, disrupt smoltificaton and cause intersex (ova-testes) in fish. The available literature suggests that the ability of AP and APEs to bioaccumulate in aquatic biota in the environment is low to moderate. BCFs and BAFs in biota, including algae, plant, invertebrates and fish range from 0.9 to 3400. Although there are relatively few data available for OP or OPEs, their potential to bioaccumulate is expected to be similar to that of corresponding NP and NPEs.[5,6]

APs and APEs act as xenoestrogens in human cells.[7] APs and APEs bind to the estrogen receptor resulting in the expression of several responses both in vitro and in vivo, including the induction of vitellogenin. The threshold for vitellogenin induction in fish is 10 ug/L for NP and 3 ug/L for OP. APEs also affect the growth of testes, alter normal steroid metabolism, disrupt smoltificaton and cause intersex (ova-testes) in fish. The available literature suggests that the ability of AP and APEs to bioaccumulate in aquatic biota in the environment is low to moderate. BCFs and BAFs in biota, including algae, plant, invertebrates and fish range from 0.9 to 3400. Although there are relatively few data available for OP or OPES, their potential to bioaccumulate is expected to be similar to that of

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[2] T. Vega Morales, M.E. Torres Padrón, Z. Sosa Ferrera, J.J. Santana Rodríguez, 2009. Determination of alkylphenol ethoxylates and their degradation products in liquid and solid samples. TrAC Trends in Analytical Chemistry, Vol. 28 No. 10, pp. 1186-1200. https://www.sciencedirect.com/science/article/abs/pii/S0165993609001666.

[3] P. Whitehouse, 2002. Environmental Impacts of Alkylphenol Ethoxylates and Carboxylates. Part 1: Proposals for the Development of Environmental Quality Standards. R&D Technical Report P2-115/TR3. Environment Agency, Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol BS32 4UD.

[4] EPA, 2011. DfE Alternatives Assessment for Nonylphenol Ethoxylates, pp. 9-14.

[5] Mark R. Servos, 1999. Review of the Aquatic Toxicity, Estrogenic Responses and Bioaccumulation of Alkylphenols and Alkylphenol Polyethoxylates, Water Qual. Res. I. Canada,Volume 34, No. 1, 123-177. A support document for Environment Canada's environmental assessment under the Canadian Environmental Protection Act. P. 123.

[6] Schenectady International, 2008. Alkylphenols Category Section One: Development of Categories and Test Plans. http://www.epa.gov/hpv/pubs/summaries/alkylphn/c13007rt.pdf Includes *p*-dodecylphenol. In particular, see table of aquatic toxicity values, p. 17.

[7] Mark R. Servos, 1999. Review of the Aquatic Toxicity, Estrogenic Responses and Bioaccumulation of Alkylphenols and Alkylphenol Polyethoxylates, Water Qual. Res. I. Canada,Volume 34, No. 1, 123-177. A support document for Environment Canada's environmental assessment under the Canadian Environmental Protection Act.

corresponding NP and NPEs.[8,9] Although less data is available about dodecylphenol, research shows that it has similar toxic and endocrine-disrupting effects and bioaccumulates in the environment.

Conclusion

The iodine listings should not permit iodophors containing alkylphenols or alkylphenol ethoxylates. They should be annotated "without octylphenol, nonylphenol, dodecylphenol, octylphenol ethoxylate, nonylphenol ethoxylate, or dodecylphenol ethoxylate."

Thank you for your consideration of these comments.

Sincerely,

Terry Shistar, Ph.D.
Board of Directors

[8] Mark R. Servos, 1999. Review of the Aquatic Toxicity, Estrogenic Responses and Bioaccumulation of Alkylphenols and Alkylphenol Polyethoxylates, Water Qual. Res. I. Canada,Volume 34, No. 1, 123-177. A support document for Environment Canada's environmental assessment under the Canadian Environmental Protection Act. P. 123.

[9] Schenectady International, 2008. Alkylphenols Category Section One: Development of Categories and Test Plans. http://www.epa.gov/hpv/pubs/summaries/alkylphn/c13007rt.pdf Includes *p*-dodecylphenol. In particular, see table of aquatic toxicity values, p. 17.