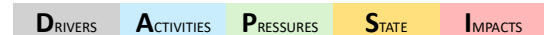


Alkylphenols and their ethoxylates

(CAS numbers: e.g. 140-66-9, 104-40-5, 25154-52-3, 84852-15-3, 1806-26-4, EC numbers: e.g. 205-426-2, 203-199-4, 246-672-0, 284-325-5, 217-302-5 / Entry number in HELCOM list of priority substances: 3)

General sectors: *Industry and commercial products, off-shore (shipping)*



Why a HELCOM priority?

Main evidence

S Concentrations of 4-tert-Octylphenol exceed the applied threshold value in **6** of the 21 examined areas (assessment units) of the Baltic Sea. The threshold is exceeded in both coastal and off-shore areas (**2/7** assessed off-shore areas). In these 6 areas, on average **43%** of the assessable samples in **water** and/or **sediment** exceed the threshold value. This is based on monitoring data for the period 2015-2024 available in national and international databases¹ and scientific articles/reports², as well as target screening data from the project PreEMPT³. A total number of 502 data points were possible to evaluate for 4-tert-Octylphenol.

By further considering how much above or below the threshold each concentration is, and how often the substance is detected, 4-tert-Octylphenol scores **6.6/10** (confidence range: **6.5 – 7.2**) in the scale established when assessing the criticality/significance of current levels in the Baltic Sea pose, where 5 indicates concern and 10 extreme risk, and the range reflects the level of reliability and representativeness of concentrations and the thresholds.

Concentrations of nonylphenols and octylphenol ethoxylates also frequently exceed their respective threshold value, with the ethoxylates exceeding the threshold value for **biota**. The threshold values for the three substances mentioned, were acquired from the EQS Directive⁴ for water, and from the ecotoxicology database of NORMAN Network for sediment and biota⁵.

I Current levels in the Baltic Sea indicate potential negative impacts on pelagic biota, sediment dwelling biota, and top predators such as seals.

Supporting evidence

P Approximately **4 – 70 tonnes of alkylphenols and their ethoxylates** are estimated to enter the Baltic Sea every year, mainly via rivers, and secondly from direct releases from land-based activities or WWTPs (WATERBASE⁶, Undeman et al⁷). The range is large, as there is contradicting data on measured inputs and the group itself is broad. Additional inputs may be expected from off-shore activities (see under Activities below) and from atmospheric deposition. Given that the substances in this group are **very persistent and very toxic**⁸, current inputs are considered as likely significant, in terms of risk they pose for the Baltic Sea and its ecosystem services. As mentioned above, levels in Baltic Sea have already exceeded thresholds, due not only to current but also the likely higher historical inputs.

S According to Swedish monitoring data, levels of alkylphenols are decreasing in Sweden's off-shore sediments, although they are still above the limit of quantification.

I Alkylphenols are considered have an **especially concerning mode of toxicity**, as many of them are endocrine disruptors⁹. Endocrine disruptors mimic or interfere with hormones and can cause developmental abnormalities, reproductive dysfunction, and population effects.

Overall assessment

When assessing current levels in the Baltic Sea, current inputs, and the severity of the relevant toxicity mechanism, for example 4-tert-Octylphenol scores **68-74/100** in the scale established for assessing the overall risk for impacts/threat for the Baltic Sea, where 50 indicates concern, 100 extreme risk, and the width of the span outlines the uncertainty in the assessment. Besides 4-tert-Octylphenol, for several other alkylphenols (i.e. hydrocarbylphenols that have aliphatic saturated hydrocarbyl substituents on the phenol), in particular those with branched or linear alkyl chains with 3 to 15 carbons, there is evidence of hazardous (endocrine disrupting) properties and concerning environmental fate and/or occurrence profiles¹⁵. Furthermore, ethoxylated alkylphenols have been shown to degrade to alkylphenols in the environment or wastewater treatment plants, with some also having endocrine disrupting properties as such¹⁶. This substance group entry aims to reflect all such relevant individual substances.

Facts relevant for management considerations

Causal chain and pathways

A The REACH registered volume (manufacture/import in the EU) for substances in the group is >20,000 tonnes/year¹⁰. However, part of it is registration of alkylphenols as monomer in imported polymers. Thus, the minimum estimate is likely lower for the overall group.

According to ECHA Assessments for Regulatory Needs ¹¹ / REACH registered uses, octylphenol is used in adhesives, coatings, paints, inks, thinners, paint removers, flocculants, tyres and rubber products, polymer preparations and compounds, and as an intermediate. An evaluation of the information in ECHA's prioritisation assessment for inclusion of SVCHs on the Authorization list¹² reflected that all registered tonnage either refers to intermediate uses (e.g. monomer for polymerisation) or import of polymers containing it. Similar is the situation for nonylphenols, which, apart from intermediate uses (e.g. manufacture of epoxy resins) or import of polymers containing it, it has also been registered for uses in fuels; water treatment; oil fields; adhesives/sealants; coatings, paints, paint removers; inks and toners; fillers/putties/plasters/modelling clay. According to ECHA's prioritisation assessment¹², it is unclear if uses e.g. as adhesives indeed take place and if they are uses of the substance (note: perhaps could be uses of polymers/resins containing the substance as monomer?).

For octylphenol ethoxylates, the REACH authorised volume is >150 tonnes/year (volume for some authorised uses is confidential)¹³. In 2014, before inclusion to the authorisation regime, the volume on the market was 1,000 -10,000 t/y¹². REACH sectors of authorised uses for octylphenol ethoxylates are in **pharma/medical/diagnostic products** as such and also their manufacture and their **packaging**. As well as in **aerospace and defence**¹³.

Shipping emissions relate to bilge water or ballast water¹⁴.

P Estimated inputs are available for several individual substances and large sub-groups, both for riverine inputs and for WWTP effluents (which emit either upstream in rivers or directly to the coast). In general, WWTPs do not appear to be the main contributor of overall riverine inputs. Among various sources of riverine emissions may also be release from biosolids used in agriculture. No quantified information is available for

shipping emissions or atmospheric deposition. Alkylphenols are in general released not only due to their uses as such, but also due to degradation of their ethoxylates (to be confirmed if they can also be released in relevant rates also from polymers containing it).

Relevant policies (existing or planned measures)

M (on A/P)

- Several alkylphenols and ethoxylates are listed as SVHC (Substances of Very High Concern) under EU REACH (mainly on the basis of their endocrine disrupting properties for the environment, but some also due to their PBT properties).

Octylphenol ethoxylates have further been included in the REACH Authorization list. ECHA (and perhaps some EU Member States, to be confirmed) has also developed Assessments of Regulatory needs (ARN) for various alkylphenols – whereas for some others ARNs are under preparation.

- Nonylphenols and Octylphenols are listed as priority hazardous substances or priority substances under the EU WFD. And as priority substances in its update proposal.
- There are provisions in EU Best Available Techniques Reference documents for these substances.

References:

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16.

[Note: Listing of detailed references will be provided in an upcoming update of the fact sheet – for a listing of the most common references among the different substances see the section at the end of the consolidated document which includes all the fact sheets]