Chemical Information Sheet
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ALKYLPHENOLS (APs)

Other Names	Octylphenols (OPs), mixed isomers Nonylphenols (NPs), mixed isomers

CAS Number	Substance
140-66-9	4-tert-Octylphenol
1806-26-4	4-n-Octylphenol
27193-28-8	Octylphenol
104-40-5	4-nonylphenol
11066-49-2	Isononylphenol
25154-52-3	Nonylphenol
84852-15-3	Phenol, 4-nonyl-, branched

May Be Found In

- Outsole materials of shoes
- Plastic and rubber components of apparel, footwear, and accessories
- Jelly plastic sandals

Alkylphenols are a family of organic compounds obtained by the alkylation of phenols. Both OPs and NPs are families of substances with identical molecular formulas and mass, but different chemical structures (isomers). Commonly used APs are listed to the left.

Uses in the Supply Chain

APs are intermediates in the manufacture of many substances, including the widely-used surfactant class of alkylphenol ethoxylates (APEOs).[1] NPs are also intermediates in the production of antioxidants used to protect or stabilize polymers such as rubber and polyvinyl chloride (PVC) while OPs are also intermediates in the production of phenolic resins used in bonding agents. Biodegradation of APEOs into APs is the main source of APs in the environment, but they can also be formed during polymer manufacturing from thermal decomposition of intentionally added AP based substances such as antioxidants.

Why Alkylphenols (APs) are Restricted[2]

- Legislation around the world restricts APEOs and APs. Leading apparel and footwear brands have banned or set strict limits on APs in their products.
- Some APs are very toxic to aquatic life with long lasting effects.
- Some APs are suspected of damaging human fertility and unborn children.

Sourcing Compliant Materials from Your Suppliers

- Contact your suppliers and explain that you require their manufactured materials to be compliant with the current AFIRM RSL limits.[3]
- Require suppliers to submit a confirmation of material compliance or a test report from a third-party lab.
- When materials are received consider performing risk-based testing to ensure current AFIRM RSL limits are met.
- Pay special attention to suppliers of plastic/rubber footwear materials and plastic/rubber components for apparel and accessories like bags and belts.
- Share this information sheet with your material suppliers and instruct them to work with their chemical suppliers to source AP-compliant chemical formulations using the guidance in the next section.

- Advise your material suppliers to adjust the time and temperature used to process their plastic/rubber materials to minimize thermal decomposition of NP-based stabilizers into NP.

Sourcing Compliant Formulations from Your Chemical Suppliers

- For all formulations, request Safety Data Sheet (SDS) documentation that meets current GHS requirements.
- Check the SDS of all chemical formulations to ensure that none of the AP CAS Numbers listed in this document are listed as ingredients.
- Contact your suppliers and explain that you require formulations to be compliant with the current ZDHC MRSL limits whenever applicable.[4] Have them confirm with a certification or, if necessary, by providing a test report from a third-party testing laboratory.
- Pay special attention to suppliers of polymer starting materials and polymer additives like stabilizers used in footwear and plastic/rubber component production.
  - Poor qualities of the polymer antioxidant and PVC stabilizer tris (4-nonyl-phenyl) phosphite (TNPP), CAS 26523-78-4, may contain very high residual concentrations of NP and should be rejected.
- Perform risk-based checks of your chemical suppliers' formulations by submitting samples to a third-party laboratory for testing to ensure the ZDHC MRSL limits are not exceeded whenever applicable.
- Discuss with your chemical supplier whether any safer alternatives are available that are suitable substitutes for your production needs.
- Prior to procuring any formulation, the chemical properties must be reviewed to ensure that proper protective equipment, chemical storage facilities, facility engineering controls, and associated treatment/disposal facilities are appropriate for the chemical(s).

Safer Alternatives

- Calcium/zinc stabilizers containing no NP-based antioxidants are available on the market. Contact your chemical suppliers for more information. These stabilizers may be suitable for your production needs. Any chosen alternative must be compliant with the limits stated above as well as any brand specific limits.

Additional Information

- US EPA Design for the Environment working group performed an Alternatives Assessment for Nonylphenol Ethoxylates, which may be relevant to the alkylphenols. https://www.epa.gov/sites/production/files/2014-06/documents/npe_final.pdf.
- Visit ECHA's Candidate List of substances of very high concern to view dossiers for many restricted substances https://echa.europa.eu/candidate-list-table.

References

[1] See the AFIRM Alkyphenol Ethoxylate (APEO) Chemical Information Sheet for specific information about phasing out APEOs in apparel and footwear manufacturing.

[2] Hazard information per harmonized classification and labelling approved by the European Union. Source: European Chemicals Agency, http://echa.europa.eu/

[3] Apparel and Footwear International RSL Management Group Restricted Substances List (AFIRM RSL) http://afirm-group.com/afirm-rsl/

[4] ZDHC Manufacturing Restricted Substances List (ZDHC MRSL) https://www.roadmaptozero.com/mrsl_online/