



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-Octylphenol
27193-28-8	Octylphenol
104-40-5	P-nonylphenol
11066-49-2	Isononylphenol
25154-52-3	Phenol (2,6-dimethylheptan-4-yl)
84852-15-3	Phenol, 4-nonyl-, branched

May Be Found In	<ul style="list-style-type: none">▪ Outsole materials of shoes▪ Plastic and rubber components of apparel, footwear, and accessories▪ Jelly sandals
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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 Restricted²

- 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
- 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.
- Have your suppliers confirm that their manufactured materials meet the current AFIRM limit with a certification or, if necessary, by providing a test report from a third-party laboratory.
- Perform risk-based checks of your suppliers' materials by submitting samples to a third-party laboratory for testing to ensure the limits are not exceeded.



Sourcing Compliant Formulations from Your Chemical Suppliers

- Contact your suppliers and explain that you require formulations to be compliant with the current ZDHC MRSL whenever applicable.⁴
- 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.
- Check the Safety Data Sheets (SDS) of all chemical formulations to ensure that none of the AP CAS Numbers above is listed as an ingredient.
- Have your chemical suppliers confirm that their chemical formulations meet the ZDHC MRSL limits with a certification or, if necessary, by providing a test report from a third-party testing laboratory.
- 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 the below safer alternatives are suitable substitutes for your production needs.

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 APEO Guidance 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 (Ed.). (2018, January 31). Restricted Substances List Retrieved <http://afirm-group.com/afirm-rsl/>
- ⁴ Manufacturing Restricted Substances List (Publication). (2015, December). Retrieved <http://www.roadmapzero.com/programme/manufacturing-restricted-substances-list-mrsl-conformity-guidance/>