



What are Alkylphenol ethoxylates?

Alkylphenol ethoxylates (APEOs) are non-ionic surfactants utilized in various industries. The main alkylphenols are octylphenol ethoxylates (OPEOs) and the more commonly used nonylphenol ethoxylates (NPEOs).¹ These synthetic compounds are found in many household items and have generated much concern due to their impact on the environment, wildlife, and human health.





What are the Negative Impacts?

Nonylphenol ethoxylates and octylphenol ethoxylates degrade into nonylphenol (NP) and octylphenol (OP), which accumulates in the environment and leads to an increase of toxicity over time.¹ These toxins are discharged into wastewaters and make their way to water sources, soils, and our food.² Since these toxins are persistent and bioaccumulate, their metabolites have been found in human tissues, urine, blood, and even breast milk.²⁻³

Potential Health Effects:

- Endocrine disruption
- Reproductive issues
- Skin and eye irritation
- Extreme aquatic toxicity
- Birth defects



Alkylphenols have been classified as Endocrine-disrupting chemicals (EDCs) that interfere with hormone synthesis and reproductive functions.² Metabolites of these chemicals mimic natural hormones and the effects have been a topic of concern. Studies have shown the impacts of extreme aquatic toxicity revealing some fish and aquatic invertebrates can develop both male and female sex organs after exposure.¹ These compounds also have been known to wreak havoc on the male reproductive system, including decreased testicle size, sperm count, and sperm quality.⁴

In some lab studies on mice, exposure to alkylphenols resulted in skin lesions and increased immune response.⁵ The immune and nervous system effects on humans are yet to be investigated.²

Also, exposure to NP and OP is thought to cause birth defects but this is also a topic that needs more investigation. Alkylphenol ethoxylates are guaranteed to be an interest to researchers in years to come.

What does Chiron offer?

Chiron are one of the pioneers of Reference Materials for alkylphenol ethoxylates and thus have an impressive collection of native, deuterium and ¹³C labelled compounds to support their analysis.



Method No. & Publication Year	Method Description
WATER	
ISO 18857-1:2005 (Reviewed 2019)	Water quality — Determination of selected alkylphenols — Part 1: Method for non-filtered samples using liquid-liquid extraction and gas chromatography with mass selective detection
ISO 18857-2:2009 (Reviewed 2020)	Water quality — Determination of selected alkylphenols — Part 2: Gas chromatographic-mass spectrometric determination of alkylphenols, their ethoxylates and bisphenol A in non-filtered samples following solid-phase extraction and derivatisation
ISO 24293:2009 (Reviewed 2020)	Water quality — Determination of individual isomers of nonylphenol — Method using solid phase extraction (SPE) and gas chromatography/mass spectrometry (GC/MS)
ASTM D7065 - 17	Standard Test Method for Determination of Nonylphenol, Bisphenol A, p-tert-Octylphenol, Nonylphenol Monoethoxylate and Nonylphenol Diethoxylate in Environmental Waters by Gas Chromatography Mass Spectrometry
ASTM D7742 - 17	Standard Practice for Determination of Nonylphenol Polyethoxylates (NPnEO, $3 \leq n \leq 18$) and Octylphenol Polyethoxylates (OPnEO, $2 \leq n \leq 12$) in Water by Single Reaction Monitoring (SRM) Liquid Chromatography/ Tandem Mass Spectrometry (LC/MS/MS)
ASTM D7485 - 16	Standard Test Method for Determination of Nonylphenol, p-tert-Octylphenol, Nonylphenol Monoethoxylate and Nonylphenol Diethoxylate in Environmental Waters by Liquid Chromatography/Tandem Mass Spectrometry
SOIL	
ISO/TS 13907:2012 (Reviewed 2019)	Soil quality — Determination of nonylphenols (NP) and nonylphenol-mono- and diethoxylates — Method by gas chromatography with mass selective detection (GC-MS)
ASTM D8310 – 20	Standard Test Method for Analysis of Target Phenols (TPs) in Soil by Multiple Reaction Monitoring Liquid Chromatography/Mass Spectrometry (LC/MS/MS)
TEXTILES	
ISO 18254-1:2016	Textiles — Method for the detection and determination of alkylphenol ethoxylates (APEO) — Part 1: Method using HPLC-MS
ISO 18254-2:2018	Textiles — Method for the detection and determination of alkylphenol ethoxylates (APEO) — Part 2: Method using NPLC
OTHER	
ISO 21264:2019	Surface active agents — Detergents — Determination of alkylphenol ethoxylates
ASTM D4252 – 89 (2017)	Standard Test Methods for Chemical Analysis of Alcohol Ethoxylates and Alkylphenol Ethoxylates



Reference

1. Hoponick, J. (2005) Nonylphenol Ethoxylates: A Safer Alternative Exists to This Toxic Cleaning Agent. *Sierra Club*.(11/2005), pp.3-11 [online] Available From https://www.jcaa.org/news/references/Sierra%20Club%20a%20safer%20alternative%20nonylphenol_ethoxylates3%5b1%5d.pdf Accessed 23.06.2020.
2. Acir I, Guenther K. (2018) Endocrine-disrupting metabolites of alkylphenol ethoxylates – A critical review of analytical methods, environmental occurrences, toxicity, and regulation. *Science of the Total Environment*. 635 (05/2018), pp.1530-1546.
3. Ademollo N, Ferrara F, Delise M, Fabiotti F, Funari E. (2008) Nonylphenol and octylphenol in human breast milk. *Environ Int*. 34 (7), pp. 984-987.
4. De Jager C, Bornman MS, Oosthuizen JM. (1999) The effect of p-nonylphenol on the fertility potential of male rats after gestational, lactational and direct exposure. *Andrologia*. 31(2), pp. 107-113.
5. Sadakane, K., Ichinose, T., Takano, H., Yanagisawa, R., Koike, E., Inoue, K., (2014) The alkylphenols 4-nonylphenol, 4-tert-octylphenol and 4-tert-butylphenol aggravate atopic dermatitis-like skin lesions in NC/Nga mice: alkylphenols aggravate atopic dermatitis in NC/Nga mice. *J. Appl. Toxicol*. 34 (8), pp. 893–902.

Alkylphenol ethoxylates product listing

Chiron No.	Name	Structure	No. Ethoxylates	CAS
4-n-Octylphenol ethoxylates				
1445.14	4-n-Octylphenol		n=0	1806-26-4
2286.16	4-n-Octylphenol monoethoxylate		n=1	51437-89-9
2287.18	4-n-Octylphenol diethoxylate		n=2	51437-90-2
2309.20	4-n-Octylphenol triethoxylate		n=3	51437-91-3
3688.22	4-n-Octylphenol tetraethoxylate		n=4	51437-92-4
10172.24	4-n-Octylphenol pentaethoxylate		n=5	51437-93-5
10173.26	4-n-Octylphenol hexaethoxylate		n=6	51437-94-6
2367.X-KIT	n-Octylphenol EO Kit			
4-tert-Octylphenol ethoxylates				
1446.14	4-tert-Octylphenol		n=0	140-66-9
3689.16	4-tert-Octylphenol monoethoxylate		n=1	2315-67-5
3753.18	4-tert-Octylphenol diethoxylate		n=2	2315-61-9
3754.20	4-tert-Octylphenol triethoxylate		n=3	2315-62-0
14066.20	4-tert-Octylphenol tetraethoxylate		n=4	2315-63-1
10170.24	4-tert-Octylphenol pentaethoxylate		n=5	2315-64-2
10171.26	4-tert-Octylphenol hexaethoxylate		n=6	N/A
9395.32	4-tert-Octylphenol nonaethoxylate		n=9	N/A
8576.X-KIT	4-tert-Octylphenol EO Kit			Assorted
Octylphenol metabolites				
13352.18	4-tert-Octylphenoxyethoxyacetic acid			108241-00-5

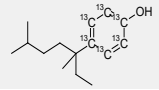
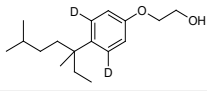
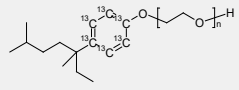
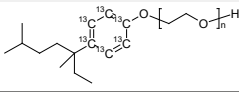
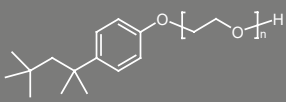
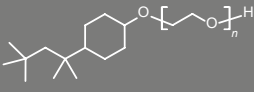
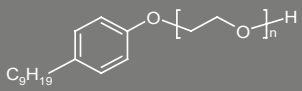
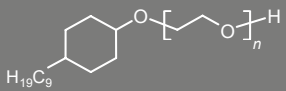
Alkylphenol ethoxylates product listing

Chiron No.	Name	Structure	No. Ethoxylates	CAS
4-n-Nonylphenol ethoxylates				
1450.15	4-n-Nonylphenol		n=0	104-40-5
1978.17	4-n-Nonylphenol monoethoxylate		n=1	104-35-8
1979.19	4-n-Nonylphenol diethoxylate		n=2	20427-84-3
8582.21	4-n-Nonylphenol triethoxylate		n=3	51437-95-7
10814.23	4-n-Nonylphenol tetraethoxylate		n=4	7311-27-5
10133.25	4-n-Nonylphenol pentaethoxylate		n=5	20636-48-0
10169.27	4-n-Nonylphenol hexaethoxylate		n=5	34166-38-6
10134.35	4-n-Nonylphenol decaethoxylate		n=10	244149-17-5
10135.45	4-n-Nonylphenol pentadecaethoxylate		n=15	17692-59-0
3755.X-KIT	n-Nonylphenol ethoxylates Kit			Assorted
Branched 4-Nonylphenols				
12479.15	4-(3,6-Dimethyl-3-heptyl)phenol		n=0	142731-63-3
12472.17	4-(3,6-Dimethyl-3-heptyl)phenol monoethoxylate		n=1	1119449-37-4
12473.19	4-(3,6-Dimethyl-3-heptyl)phenol diethoxylate		n=2	1119449-38-5
Nonylphenol ethoxylates (nonylisomer mixtures)				
2044.15	4-Nonylphenol, mixture of nonyl isomers, "Type A"		n=0	84852-15-3
2365.15	4-Nonylphenol, mixture of nonyl isomers, "Type B"		n=0	84852-15-3
10300.15	4-Nonylphenol, mixture of nonyl isomers, "Type C"		n=0	84852-15-3
1833.17	4-Nonylphenol monoethoxylate, mixture of nonylisomers		n=1	158054-23-0
1832.19	4-Nonylphenol diethoxylate, mixture of nonylisomers		n=2	155679-84-8

Alkylphenol ethoxylates product listing

Chiron No.	Name	Structure	No. Ethoxylates	CAS
1976.21	4-Nonylphenol triethoxylate, mixture of nonylisomers		n=3	27176-95-0
1977.23	4-Nonylphenol tetraethoxylate, mixture of nonylisomers		n=4	27176-97-2
10167.25	4-Nonylphenol pentaethoxylate, mixture of nonylisomers		n=5	26264-02-8
10168.27	4-Nonylphenol hexaethoxylate, mixture of nonylisomers		n=6	27177-01-1
2366.X-KIT	Nonyl(isomers)phenol EO Kit			Assorted
Nonylphenol metabolite (isomer mixture)				
1980.17	2-(4-Nonylphenoxy)acetic acid isomer mixture		n=1	3115-49-9
Internal standards				
10791.14	4-n-Octylphenol-d4		n=0	1246815-03-1
2327.14	4-n-Octylphenol-d17		n=0	1219794-55-4
10282.16	4-n-Octylphenol-d4 monoethoxylate		n=1	1346602-86-5
10283.18	4-n-Octylphenol-d4 diethoxylate		n=2	1346599-54-9
9767.14	4-tert-Octylphenol-13C6		n=0	1173020-24-0
10281.16	4-tert-Octylphenol-13C6 monoethoxylate		n=1	1173019-48-1
13111.18	4-tert-Octylphenol-13C6 diethoxylate		n=2	1173020-69-3
2414.15	4-n-Nonylphenol-2,3,5,6-d4-OD		n=0	358730-95-7
8625.15	4-n-Nonylphenol (ring13C6)		n=0	211947-56-7
8626.17	4-n-Nonylphenol-13C6 monoethoxylate		n=1	1346600-52-9
8627.19	4-n-Nonylphenol-13C6 diethoxylate		n=2	1346602-11-6
12474.15	4-(3,6-Dimethyl-3-heptyl)phenol-3,5-d2		n=0	1173020-19-3

Alkylphenol ethoxylates product listing

Chiron No.	Name	Synonym / Structure	No. Ethoxylates	CAS
12476.15	4-(3,6-Dimethyl-3-heptyl)phenol-13C6		n=0	1173020-38-6
12475.17	4-(3',6'-Dimethyl-3'-heptyl)phenol-3,5-d2 monoethoxylate		n=1	1173019-32-3
12477.17	4-(3,6-Dimethyl-3-heptyl)phenol-13C6 monoethoxylate		n=1	1173019-61-8
12478.19	4-(3,6-Dimethyl-3-heptyl)phenol-13C6 diethoxylate		n=2	1173019-36-8
Octylphenoethoxylate technical mixtures				
8577.X	POE (7-8) tert-Octylphenol	Triton X-114	n=7-8	9036-19-5 / 9002-99-1
8388.X	POE (4-17) tert-Octylphenol	Triton X-100	n=4-17	9002-93-1
11324.X	POE (12-13) tert-Octylphenol	Triton X-102	X=12-13	9002-93-1
8578.X	POE (40) tert-Octylphenol	Triton X-405	n=40	9002-93-1
Octylphenoethoxylate, reduced, technical mixtures				
11483.X	POE (7-8) tert-Octylphenol, reduced	Triton X-114; reduced		N/A
Nonylphenoethoxylate technical mixtures				
S-4097	POE (0-4) Nonylphenol	Imbentin-N/020	n=0-4	9016-45-9
S-4098	POE (1-7) Nonylphenol	Imbentin-N/040	n=1-7	9016-45-9
S-4099	POE (2-9) Nonylphenol	Imbentin-N/060	n=2-9	9016-45-9
2368.3-KIT	Imbentin Kit (includes: S-4097-100MG, S-4098-100MG and S-4099-100MG)			Assorted
11323.X	POE (9-10) Nonylphenol (NPEO (9-10))	Igepal CO-630		9016-45-9 / 68412-54-4
11211.X	POE (12) Nonylphenol	T-DET N-12		9016-45-9
11212.X	POE (14) Nonylphenol	MAKON 14		9016-45-9
11213.X	POE (20) Nonylphenol	Igepal CO-850		9016-45-9
11482.X	POE (10) Nonylphenol	Arkopal N-100		9016-45-9
Nonylphenoethoxylate, reduced, technical mixtures				
11481.X	POE (9-10) tert-Octylphenol, reduced			123359-41-1

Alkylphenol ethoxylates mixes

Chiron No.	Name (Mix number)	Composition [CAS]	Concentration / Solvent
S-4705-ASS-AC	4-Nonyl- and 4-tert-Octylphenol ethoxylates Mixture (Phenol Mix 35)	2044.15 4-Nonylphenol, mixture of nonyl isomers, "Type A" [84852-15-3] 100 µg/mL 1833.17 4-Nonylphenol monoethoxylate, mixture of nonylisomers [158054-23-0] 100 µg/mL 1832.19 4-Nonylphenol diethoxylate, mixture of nonylisomers [155679-84-8] 100 µg/mL 1976.21 4-Nonylphenol triethoxylate, mixture of nonylisomers [27176-95-0] 100 µg/mL 1445.14 4-n-Octylphenol [1806-26-4] 20 µg/mL 1446.14 4-tert-Octylphenol [140-66-9] 20 µg/mL 3689.16 4-tert-Octylphenol monoethoxylate [2315-67-5] 20 µg/mL 3753.18 4-tert-Octylphenol diethoxylate [2315-61-9] 20 µg/mL 3754.20 4-tert-Octylphenol triethoxylate [2315-62-0] 20 µg/mL 1450.15 4-n-Nonylphenol [104-40-5] 20 µg/mL 1220.15 Bisphenol A [80-05-7] 20 µg/mL	Assorted in acetone
S-5021-ASS-AC	4-Nonyl- and 4-tert-Octylphenol ethoxylates Mixture (Phenol Mix 35B)	2044.15 4-Nonylphenol, mixture of nonyl isomers, "Type A" [84852-15-3] 20 µg/mL 1833.17 4-Nonylphenol monoethoxylate, mixture of nonylisomers [158054-23-0] 20 µg/mL 1832.19 4-Nonylphenol diethoxylate, mixture of nonylisomers [155679-84-8] 20 µg/mL 1976.21 4-Nonylphenol triethoxylate, mixture of nonylisomers [27176-95-0] 20 µg/mL 1445.14 4-n-Octylphenol [1806-26-4] 4 µg/mL 1446.14 4-tert-Octylphenol [140-66-9] 4 µg/mL 3689.16 4-tert-Octylphenol monoethoxylate [2315-67-5] 4 µg/mL 3753.18 4-tert-Octylphenol diethoxylate [2315-61-9] 4 µg/mL 3754.20 4-tert-Octylphenol triethoxylate [2315-62-0] 4 µg/mL 1450.15 4-n-Nonylphenol [104-40-5] 4 µg/mL 1220.15 Bisphenol A [80-05-7] 4 µg/mL	Assorted in acetone
S-4601-ASS-IO	Phenol ethoxylates Mix 01	2044.15 4-Nonylphenol, mixture of nonyl isomers, "Type A" [84852-15-3] 100 µg/mL 1833.17 4-Nonylphenol monoethoxylate, mixture of nonylisomers [158054-23-0] 100 µg/mL 1832.19 4-Nonylphenol diethoxylate, mixture of nonylisomers [155679-84-8] 100 µg/mL 1976.21 4-Nonylphenol triethoxylate, mixture of nonylisomers [27176-95-0] 100 µg/mL 1445.14 4-n-Octylphenol [1806-26-4] 20 µg/mL 1446.14 4-tert-Octylphenol [140-66-9] 20 µg/mL 3689.16 4-tert-Octylphenol monoethoxylate [2315-67-5] 20 µg/mL 3753.18 4-tert-Octylphenol diethoxylate [2315-61-9] 20 µg/mL 3754.20 4-tert-Octylphenol triethoxylate [2315-62-0] 20 µg/mL	Assorted in isooctane
S-4730-10-ME	Mono and di- phenol ethoxylates mixture (Phenol ethoxylates Mix 02)	1833.17 4-Nonylphenol monoethoxylate, mixture of nonylisomers [158054-23-0] 1832.19 4-Nonylphenol diethoxylate, mixture of nonylisomers [155679-84-8] 3689.16 4-tert-Octylphenol monoethoxylate [2315-67-5] 3753.18 4-tert-Octylphenol diethoxylate [2315-61-9]	10 µg/mL in methanol
S-5082-2K-DC	tert-Octylphenol monoethoxylate and diethoxylate mixture (Phenol ethoxylates Mix 08)	3689.16 4-tert-Octylphenol monoethoxylate [2315-67-5] 3753.18 4-tert-Octylphenol diethoxylate [2315-61-9]	2000 µg/mL in dichloromethane

Alkylphenol ethoxylates mixes

Chiron No.	Name (Mix number)	Composition [CAS]	Concentration / Solvent
S-5088-20-IO	Mixture of Five tert-Octyl and Five n-Nonylphenoethoxylates (Phenol ethoxylates Mix 09)	1450.15 4-n-Nonylphenol [104-40-5] 1978.17 4-n-Nonylphenol monoethoxylate (EO) [104-35-8] 1979.19 4-n-Nonylphenol diethoxylate (2EO) [20427-84-3] 10133.25 4-n-Nonylphenol pentaethoxylate (5EO) [20636-48-0] 10134.35 4-n-Nonylphenol decaethoxylate (10EO) [244149-17-5] 1446.14 4-tert-Octylphenol [140-66-9] 3689.16 4-tert-Octylphenol monoethoxylate (EO) [2315-67-5] 3753.18 4-tert-Octylphenol diethoxylate (2EO) [2315-61-9] 10170.24 4-tert-Octylphenol pentaethoxylate (5EO) [2315-64-2] 9395.32 4-tert-Octylphenol nonaethoxylate (9EO) [N/A]	20 µg/mL in isooctane
S-5089-20-IO	Mixture of 13C6 tert-Octyl and n-Nonyl diethoxylates (Phenol ethoxylates Mix 10)	8627.19 4-n-Nonylphenol-13C6 diethoxylate [1346602-11-6] 13111.18 4-tert-Octylphenol-13C6 diethoxylate [1173020-69-3]	20 µg/mL in isooctane
S-5104-10-ME	Mix. of octyl- and nonylphenol ethoxylates (Phenol ethoxylates Mix 11)	1445.14 4-n-octylphenol [1806-26-4] 1450.15 4-n-nonylphenol [104-40-5] 11323.X POE (9-10) Nonylphenol (NPEO (9-10)) [68412-54-4] 8388.X POE (4-17) tert-Octylphenol [9002-93-1] 1446.14 4-tert-Octylphenol [140-66-9] 2044.15 4-Nonylphenol, mixture of nonyl isomers, type A [84852-15-3]	10 µg/mL in methanol









For ordering and information about prices and delivery in your country, please contact your local distributor:



Your quality is our business

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