Arvin substances

Safety evaluation

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The European Chemical Industry Council, AISBL – Rue Belliard, 40 - 1040 Brussels – Belgium
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What is the link between “Arvin” substances and antioxidants?

Non-Intentionally Added Substances (NIAS)

Antioxidants are additives used to **improve or maintain the physical properties of materials**, such as polymers, ensuring processing and thermal stress, safe transport, and storage of drinking water contact materials. Some additives can degrade over time and potentially form non-intentionally added impurities, such as the so-called Arvin substances.

Arvin substance identification

Professor Erik Arvin identified **10 chemicals** migrating from additives used in plastic pipes in contact with drinking water.

These organic compounds are known as Arvin substances (Arvin 1 to Arvin 10).

Safety Assessment

Providing European Authorities with safety assessments data on Arvin substances is a key priority for the industry.
Recently, **ELiSANA** engaged with authorities to provide **experimental data** for the **Drinking Water Positive List Limit** (DWPLL) in the context of the European Drinking Water Directive.

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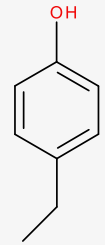
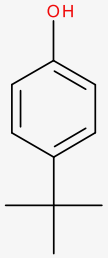
Arvin Substances

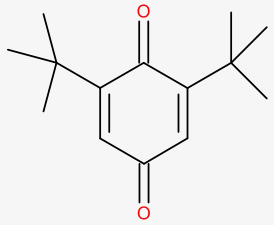
Arvin 1
CAS 123-07-9
4-ethylphenol



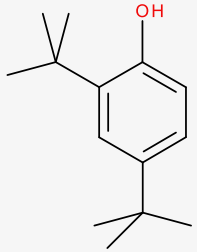
Arvin 2
CAS 98-54-4
p-tert-butylphenol



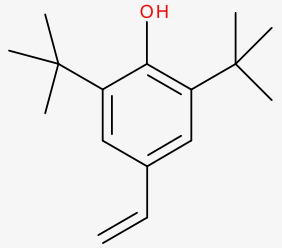
Arvin 3
CAS 719-22-2
2,6-di-tert-butyl-p-benzoquinone



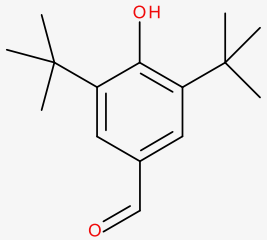
Arvin 4
CAS 96-76-4
2,4-di-tert-butylphenol



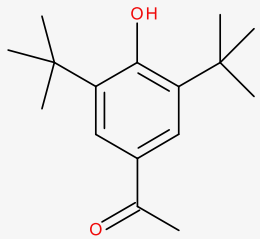
Arvin 5
CAS 19263-36-6
3,5-di-tert-butyl-4-hydroxystyrene



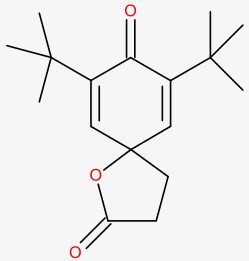
Arvin 6
CAS 1620-98-0
3,5-di-tert-butyl-4-hydroxybenzaldehyde



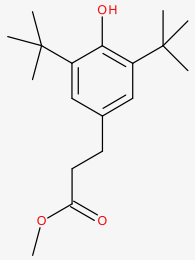
Arvin 7
CAS 14035-33-7
3,5-di-tert-butyl-4-hydroxy acetophenone



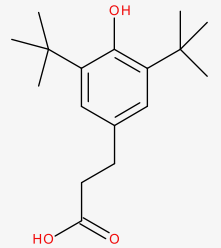
Arvin 8
CAS 82304-66-3
7,9-di-tert-butyl-1-oxaspiro(4,5)deca-6,9-diene-2,8-dione



Arvin 9
CAS 6386-38-5
3-(3,5-di-tert-butyl-4-hydroxyphenyl) methylpropanoate



Arvin 10
CAS 20170-32-5
3-(3,5-di-tert-butyl-4-hydroxyphenyl) propanoic acid



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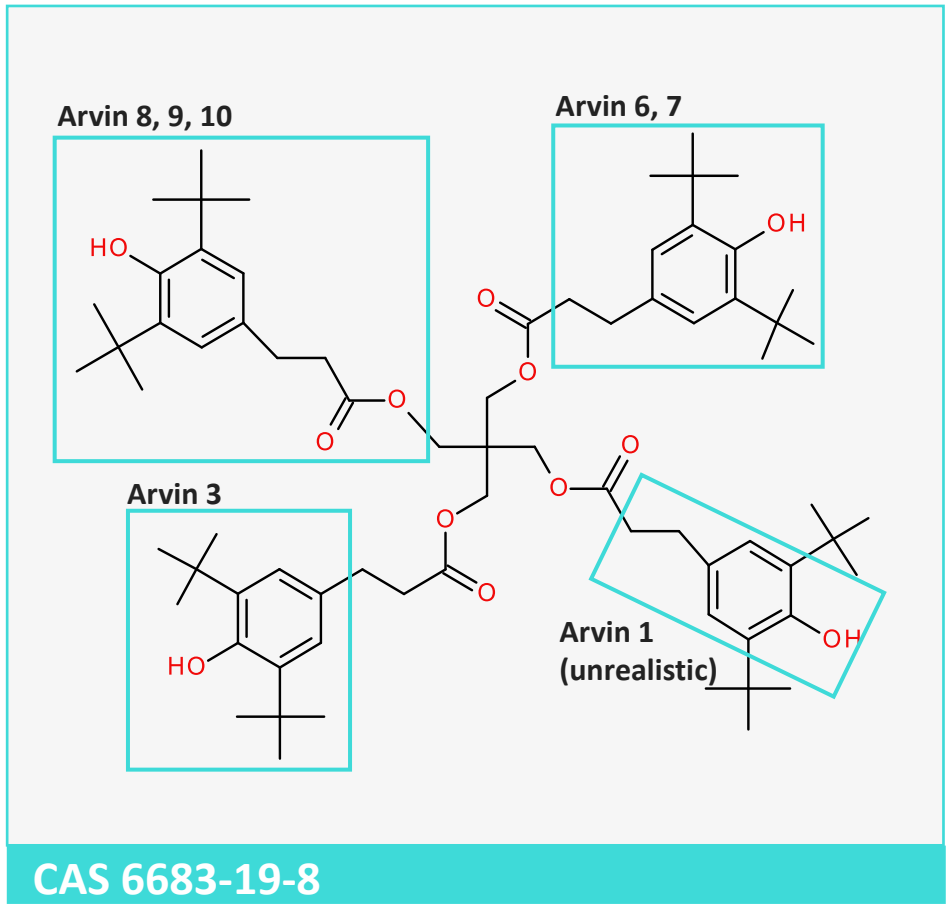
Possible formation of Arvin substances

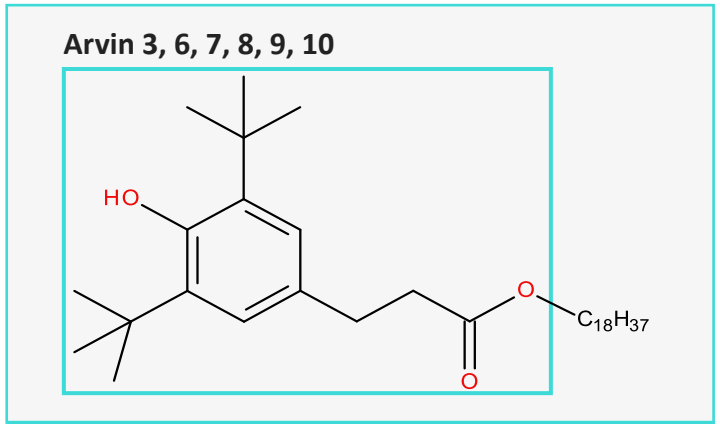
The three CAS numbers in the blue boxes potentially lead to forming the Arvin substances displayed.

Nevertheless, some of the formations are unrealistic, as indicated.

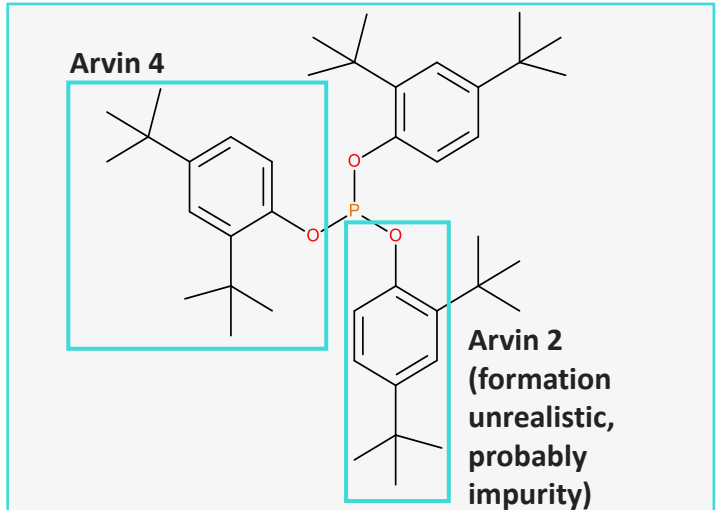
Arvin 5 formation is not displayed, as ELiSANA believes it is an artifact, which detection is a consequence of the analytical methods used.



CAS 6683-19-8



CAS 2082-79-3



CAS 31570-04-4

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Summary on Safety Evaluation

Substance	Conclusion on Genotoxicity	Drinking Water Positive List Limit (DWPLL)
CAS 123-07-9 (Arvin 1)	negative	0.1 µg/l
CAS 98-54-4 (Arvin 2)	negative	2.5 µg/l
CAS 719-22-2 (Arvin 3)	negative	2.5 µg/l
CAS 96-76-4 (Arvin 4)	negative	250 µg/l
CAS 19263-36-6 (Arvin 5)*	*No test needed*	0.1 µg/l *(based on HPV [2])*
CAS 1620-98-0 (Arvin 6)	negative	2.5 µg/l
CAS 14035-33-7 (Arvin 7)	negative	2.5 µg/l
CAS 82304-66-3 (Arvin 8)	negative	100 µg/l**
CAS 6386-38-5 (Arvin 9)	negative	50 µg/l as sum
CAS 20170-32-5 (Arvin 10)	negative	

* Arvin 5 is not detected in drinking water.
** The Arvin 8 value of 100 µg/l present in the DWPLL, and supported by ELiSANA, has been derived by the German Federal Environment Agency (UBA) based on an OECD 408 study that some members of ELiSANA finalised in 2023.

Studies used for safety evaluation

ELiSANA has generated some of the studies used to develop Safety evaluation values.

These studies have been shared with European Authorities for regulatory purposes and are not publicly available.

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References

EFSA, 2016. Recent developments in the risk assessment of chemicals in food and their potential impact on the safety assessment of substances used in food contact materials. EFSA Journal 2016;14(1):4357, doi:10.2903/j.efsa.2016.4357, published: 28 January 2016

EFSA/WHO, 2016. Review of the Threshold of Toxicological Concern (TTC) approach and development of new TTC decision tree. EFSA supporting publication 2016:EN-1006, published: 10 March 2016

German Environment Agency, 2016. Guideline on the hygienic assessment of organic materials in contact with drinking water (KTW Guideline). Consulted on 07 March 2016

D. Brocca, E. Arvin, H. Mosbæk, 2002. Identification of organic compounds migrating from polyethylene pipelines into drinking water. Water Research, Elsevier Science Ltd, Volume 36, Issue 15, Pages 3675-3680, published online: 19/03/2002

C. Kalweit, E. Stottmeister, T. Rapp, 2019. Contaminants migrating from crossed-linked polyethylene pipes and their effect on drinking water odour. Water Research, Elsevier Science Ltd, Volume 161, 15 September 2019, Pages 341-353, published online: 5/06/2019

https://www.pe100plus.com/PPCA/Risk-Assessment-of-Non-Intentionally-Added-Substances-NIAS-in-potable-water-p1734.html

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Thank you.

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About Cefic

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Cefic sector group

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