



Diethylphosphinic acid

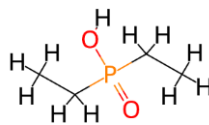
Diethylphosphinic acid is used as a flame retardant, e.g. in the form of its aluminium salt (aluminium tri-diethylphosphinate; CAS 225789-38-8).¹

In the European Economic Area, aluminium tri-diethylphosphinate is produced and/or imported in quantities of approx. 1,000 tonnes to 10,000 tonnes per year and is registered under the REACH Regulation.²

Molar Mass:
122.104 g/mol

CAS: 813-76-3

C₄H₁₁O₂P



The measurements of the LANUV meet the following necessary criteria for clear identification:

- 1) Match of the exact mass, ± 5 ppm
- 2) Match of the isotope pattern, min. 70 %
- 3) Match of a reference spectrum
- 4) Match of the retention time with the reference substance

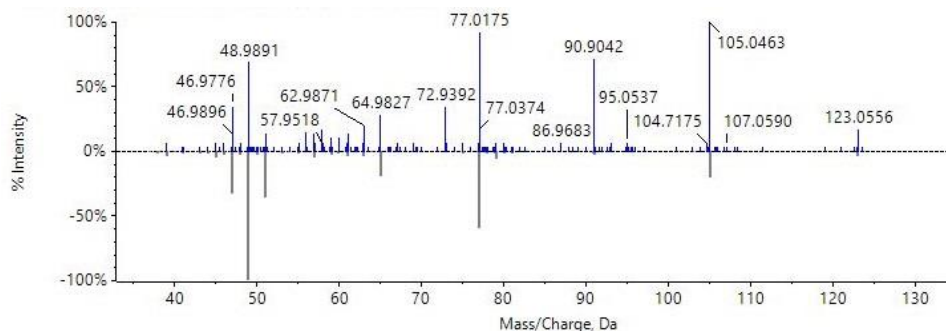


Figure 1: comparison of fragment-ion-spectra (ESI positive); blue: sample rhine-km 718 left (01.10.2024), grey: reference substance

¹ <https://pubchem.ncbi.nlm.nih.gov/compound/21863131#section=Use-and-Manufacturing>, 07.04.2025

Analytics and occurrence

The laboratory manager of a water supplier based in Cologne had reported findings of the substance diethylphosphinic acid at Rhine kilometre 684.5 to the LANUV. As part of the non-target screening (HPLC-HRMS), a corresponding peak was detected in cross-section samples of the Rhine. Following discussions and an exchange of information, the reference substance was made available to the LANUV. This was used to clearly identify the peak as diethylphosphinic acid. The results of the cross-section samples indicate a discharge on the left bank of the Rhine between Rhine kilometre 674 and 718.

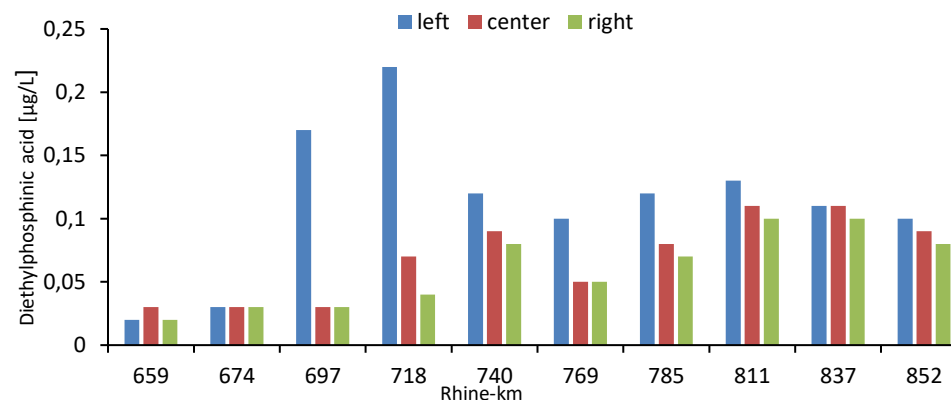


Figure 2: Concentrations for diethylphosphinic acid from the Rhine cross-section samples from 23.09.2024 to 25.09.2024

Based on the findings, the wastewater discharges in question (between Rhine kilometre 674 and 718) are additionally tested for diethylphosphinic

² <https://echa.europa.eu/de/substance-information/-/substanceinfo/100.102.669>, 07.04.2025



acid as part of the official LANUV monitoring in order to identify the polluter(s). A potential discharger was identified after a short time.

Relevance

No ecotoxicological data is available for diethylphosphinic acid.

For aluminium diethylphosphinate, a complete data set on ecotoxicology is available in the database of the European Chemicals Agency ECHA. There is also further data in the specialised literature. Overall, daphnia react most sensitively; effects on reproduction have already been observed in the low single-digit mg/L range. The environmental behaviour test results available from ECHA indicate that the substance is not readily biodegradable. A high bioaccumulation potential is not expected.

There are no legally binding limit values for diethylphosphinic acid for drinking water. The general precautionary value of 0.1 µg/L is therefore used for the assessment. Hardly any data on the environmental behaviour of the substance can be researched. An assessment of its relevance to drinking water is therefore not yet possible.

There is also no legally binding limit value for aluminium diethylphosphinate for drinking water, so the general precautionary value of 0.1 µg/L is applied. According to the ECHA substance dossier, aluminium diethylphosphinate is not readily biodegradable, has a low bioaccumulation potential and does not tend to adsorb to soil particles. Due to its properties, the substance remains

primarily in the water phase and is therefore classified as potentially relevant for drinking water. Data on the behaviour in drinking water treatment are not yet available.³

Further procedure:

The responsible water authorities have been informed. The Rhine will continue to be sampled in order to verify the potential discharger and identify any others.

³ECHA: Aluminium tridiethylphosphinate, <https://echa.europa.eu/de/registration-dossier/-/registered-dossier/18633/5/5/2>, 07.04.2025