

Information sheet – phosphonic acid

With this fact sheet, Skal wants to inform the importing companies that phosphonic acid (PA) was found in, among others, organic ginger from China and from various South American countries. In addition, phosphonic acid was also found in other imported products such as citrus fruits and other products (such as avocados, passion fruit, grapes, apples, nuts, seeds, etc.). Phosphonic acid is an input (made consciously or unconsciously) that can be used as a fungicide to protect products against moulds or to extend the life of the products. The use of phosphonic acid is not allowed and by means of this fact sheet, Skal wants to further inform companies, so that they can take this risk into account in their sampling and analyses. Furthermore, information is shared on what a company should do if phosphonic acid is found in an organic product.

Background information

Skal has received many reports from companies in which phosphonic acid (H_3PO_3) has been detected in imported products. Products made from imported raw materials (such as juices and flour-based products) have also been found to contain phosphonic acid. Phosphoric acid (H_3PO_4) is another chemical compound, and this is the raw material for phosphate artificial fertilizers, for example. Phosphonic acid is commercially marketed by Bayer, Dow, BASF, and other companies as a fungicide.



Figure 1; Various commercially available fungicides based on phosphonic acid.

Phosphonic acid is a chemical product made by various chemical processes according to the equations below.

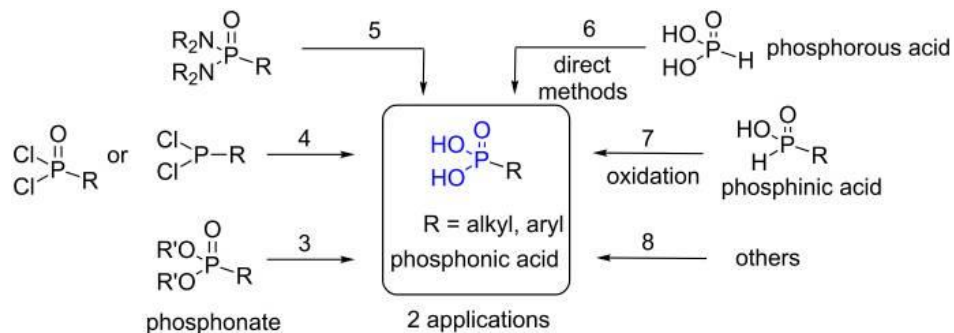


Figure 2; Processes to produce phosphonic acid and other phosphetyl variants.

In addition to the acid variant; H-Phosphetyl (H_3PO_3), there is also the aluminium variant; Al-Phosphetyl ($C_6H_{18}-Al-O_9P_3$), the sodium variant; Na-Phosphetyl ($C_2H_5O-Na-HPO_2$) and the potassium variant; K-Phosphetyl (H_3KO_4P). All four solid compounds dissolve in water to form phosphonic acid. Phosphonic acid has an application as a fungicide to combat Phytophthora and other fungal diseases in monoculture farming, for example. Additionally, it can also be used to extend the shelf life of products by washing them in a phosphonic acid mixture. Cleaning agents may also contain phosphonic acid as an active substance for disinfecting.

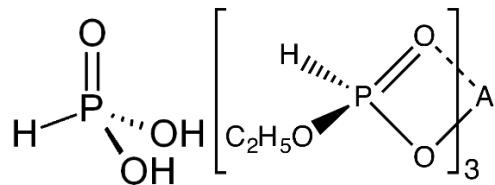


Figure 3; Various phosphonic acid compounds (phosphonic acid and phosphetyl-Al).

Commercial laboratories can detect phosphonic acid as a single residue, and this analysis is therefore **not** included in the standard multi-residue analyses using liquid chromatography and gas chromatography with mass spectrometry as detection (LC-MS and GC-MS). The current LOQ (quantification limit) is 0.01 mg/kg for phosphonic acid. Phosphonic acid and phosphoric acid are compounds that have no overlap during analysis. In other words, phosphonic acid that is found has no matrix effect with phosphoric acid.

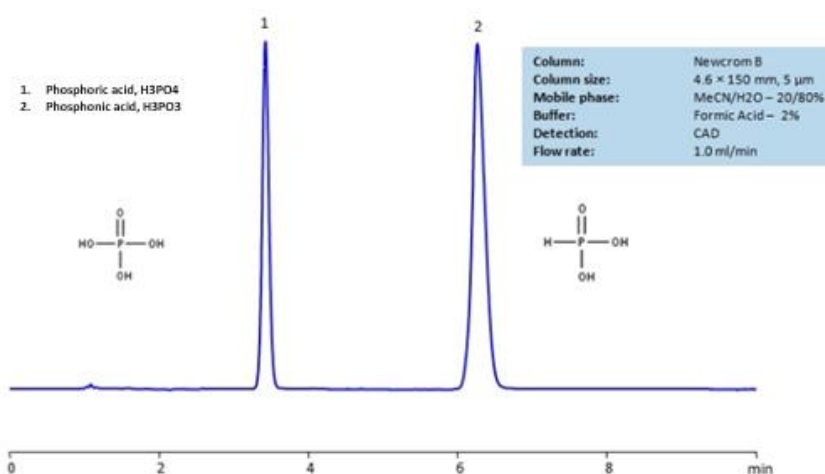


Figure 4; Single residue analysis of phosphonic acid and phosphoric acid with LC-MS.

In the future, laboratories may be able to determine phosphonic acid content with an even lower detection limit. It is therefore also important to identify the possible routes and risks of contamination with this non-permitted substance for organic products.

Skal Biocontrole does not use action limits as in other European countries. Skal published a fact sheet on phosphonic acid in 2015, but it has since been superseded by progress on insights and therefore removed from Skal's website.

In accordance with the Organic Regulation (EU) 2018/848, the use of phosphonic acid is not authorized. There are initiatives within the EU Member States to explore the possibilities of setting action limits and harmonizing, but so far there has been no green light from the committee in Brussels — that is responsible for monitoring European organic production and interpreting the regulation.

Due to the complete water solubility of phosphonic acid, it can be absorbed by the plant over a long period of time as a result of historical use. Investigation by control bodies — of groundwater, soil, leaves, and fruit of a plant or tree, for example — can help to refute and/or confirm a positive analysis.

Residue levels of fosetyl-Al and phosphonic acid must be assessed against European MRLs. Most MRLs fall in the range of 2 to 130 mg/kg.

The EU residue definition for enforcement is: '*Fosetyl-Al (the sum of fosetyl, phosphonic acid and their salts, expressed as fosetyl).*' The levels of fosetyl, phosphonic acid, and phosphonate must therefore be added together before compliance with the MRL can be assessed. The use of fosetyl-Al can lead to residues of both fosetyl and phosphonic acid, as fosetyl can break down to form phosphonic acid. However, the use of sodium phosphonate and potassium phosphonate can also lead to residues of phosphonic acid.

What the company itself can do:

Discuss with your supplier how the risks of phosphonic acid are mitigated (see also **article 28.1** of the Organic Regulation (EU) 2018/848)

- 1) Cultivation: *section on inputs, including **random** monitoring for phosphonic acid (single residue method) in soil, crops*
- 2) Processing: *part about mixing of conventional/organic batches, and use during processing (washing water?, literature). incl. **random** monitoring for phosphonic acid (single residue method) in washing water, products*

Take into account the risk that — through incorrect input lists — phosphonic acid can be used in organic products, either consciously or unconsciously, and include phosphonic acid in the analysis of your products on a regular basis. In addition, phosphonic acid can be introduced into a batch by mixing conventional products with organic products or, for example, through use of a cleaning product that contains phosphonic acid as a disinfectant.

In the event of a rash with phosphonic acid, you must do the following in accordance with Article 28.2 of the Organic Regulation 2018/848:

- 1) Block batch
- 2) If you can substantiate and refute this positive finding with facts concerning the cultivation and production of this batch through self-investigation, which show that the detected phosphonic acid is not an irregularity, the organic status of the product can be maintained. You keep the results of the investigation in your records. You do not need to notify Skal.
- 3) If the self-investigation cannot remove the doubt or confirms the suspicion, then you must report to Skal. On the basis of an investigation carried out by Skal in cooperation with other inspection organizations, a decision will be made as to the biological status of the batch

Skal Biocontrole's intention with this approach is to gain insight into the possible routes and risks of phosphonic acid contamination in organic products and share this insight with the companies.

If you have any further questions regarding this information, please contact us by e-mail at jhoesen@skal.nl or phone on +31(0)38 42 68 128.