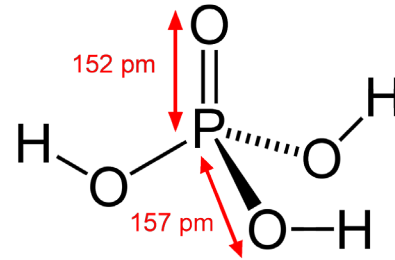


Phosphoric acid (H₃PO₄)

Origin:	Phosphorus recovery plants out of sewage sludge ashes
Recycling pathways:	<ul style="list-style-type: none"> • Technical grade acid • Merchant grade acid



DESCRIPTION

ORIGIN & AVAILABILITY

Phosphoric acid can be produced at a phosphorus recovery plant from sewage sludge ashes (ssa) with wet chemical processes such as e.g. TetraPhos®, PARFORCE, Phos4Life™.

Resources of phosphoric acid (75%) depending on P-content of ssa can be up to 10 000 tons /year/plant, based on ca. 30 000 tons ssa/y.

P-recovery plants are expected to be distributed in areas where sewage sludge incineration plants are located. The 1st industrial plant is constructed in Hamburg (2020) based on the TetraPhos® process.

A reliable provision of phosphoric acid from ssa over the year can be expected, as ssa volumes are relatively constant and as adjustments in the P-recovery process allow to reach a stable quality of acid.

QUALITY CONSIDERATIONS

As the required quality strongly varies according to the application field (Merchant Grade Acid, Technical Grade, Electronic grade), the targeted quality is reached at process level by upconcentrating and/or removing and recovery of some elements.

The specification of phosphoric acid usually includes its concentration (75-85%) and the content in elements (e.g. Al, Ca, F, Fe, K, Mg, Zn, Cl, SO₄, As, Pb).

INTEREST & VALUE

Technical and merchant grade phosphoric acid are products with an existing market. This facilitates their integration in value chains.

TIPS/BE AWARE

REACH obligations apply to recovered H₃PO₄. Fulfilling them might be eased by the fact that different phosphoric acids for different tonnage bands are already REACH registered substances (e.g. art 2 (7)d of Regulation (EC) 1907/2006 could apply).

At the recovery plant, some by-products (e.g. metal salts, gypsum, road salt), ash residue and possibly wastewater (depending on the process) are generated. The producer needs to cope with their valorisation, recycling or disposal.

The used leaching agent and the implemented impurities separation processes lead to varying qualities of phosphoric acid and different by-products.

RECYCLING PATHWAYS

The recovered phosphoric acid can be recycled as chemical for industrial application or as material in the fertiliser manufacturing process. For the latter use, the EU Fertilising Products Regulation ((EU) 2019/1009) and the existing national legislations are applicable.

TECHNICAL GRADE ACID FOR INDUSTRY

The recovered technical grade phosphoric acid from ssa can be used to produce chemical treatment liquids and electrolytes. Phosphoric acid is used e.g. for surface treatment of metals, corrosion control and rust removal, pH regulation, catalyst, drying agent, detergent and cleaner of process equipment, nutrient ratio correction at wastewater treatment plants.

The targeted sectors are the following: chemical, metallurgical, automotive, paper industry, water treatment, wastewater treatment...

The quality of technical grade acid required by the market is expected to vary over time while staying quite high, making challenging for producers to match changing specification and economic viability.

Factors in support of this recovery pathway include that the recovered technical grade phosphoric acid

from ssa can replace rock based phosphoric acid in non-food applications. Also, the quantity provided by one centralised plant can match with the demand of local industries, strengthening local partnerships.

MERCHANT GRADE ACID FOR FERTILISERS (MGA)

Merchant grade phosphoric acid can be processed into all types of straight or compound phosphate fertilisers.

The targeted users are in general fertilisers producers with international market outreach.

Less purification is needed for merchant grade acid production than for a technical grade acid production, but the market price is currently about half as high.

Due to market size, the fertiliser sector can absorb the quantity of recycled phosphoric acid in any case.

STAKEHOLDERS MAPPING

The figure shows the main stakeholders that might be implicated in the recycling pathways of phosphoric acid produced out of sewage sludge ashes.

