Phosphoric Acid Purification (PAP)

the Green Way

Phosphoric acid produced by the wet process route is impure and can be used without purification for fertilizer production. Other applications typically require higher purity phosphoric acid. Two purity levels are commonly found:

- **Technical Grade**: Generally is used for production of water soluble fertilizers, various crop nutrients, detergents and animal feed products.
- **Food Grade**: Higher purity acid used in food or pharmaceutical applications.

KBR Ecoplanning Oy purification technology offers tailor-made processes adapted to each client’s specific requirements and quality specifications. KBR Ecoplanning Oy reduce risk and simplify execution by taking overall responsibility for a complete PAP plant.

Phosphoric Acid Purification Process Overview

1. **Pre-treatment**
   - Desulphation
   - Contaminant Removal
   - Organics Removal

2. **Purification**
   - Stripping
   - Washing
   - Extraction

3. **Concentration**
   - Evaporation
   - Color Finishing
   - Final Impurity Control

Pure Acid
Purification of green phosphoric acid requires a series of steps determined by the impurities in the raw material and the finished product specifications. A typical configuration is:

**Pretreatment** (removing impurities for process efficiency and product quality):

The pretreatment section is designed based on impurities in the green phosphoric acid and final product requirements. Typically the pretreatment section begins with calcium or barium donor (via additional raw phosphate rock, limestone, lime, or other reagents) to precipitate sulphates. Heavy metals like arsenic, lead and cadmium are removed with targeted reagents in precipitation units. Organic matter and color are removed by activated carbon filtration.

**Purification** (extraction, scrubbing and stripping):

The treated stream is purified using solvent extraction based on well-proven and robust mixer-settler or pulsed column technologies. Purification occurs in three stages: extraction, scrubbing and stripping. Phosphoric acid is extracted from an aqueous solution into an organic phase, scrubbed, and stripped with demineralized water to obtain purified aqueous phosphoric acid solution.

**Concentration** to specified strength (technical or food grade) and fluoride removal

The phosphoric acid is concentrated for transportation and/or end use requirements in an evaporator at conditions designed to prevent polymerization of phosphate. In this step chlorides and part of the fluorides are removed. Final removal of remaining fluorides takes place in the de-fluorination unit. The concentrated acid is cooled and filtered to remove residual impurities, including specialty filters to meet stringent purity and color specifications.

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**KBR Ecoplanning Oy brings unique expertise to Phosphoric Acid Purification**

- The experience to optimize the configuration of the facility to minimize capital and operating expenses;
- Selection of the right unit operations to address pretreatment, purification, and concentration (which can have a significant impact on the design and operation of the facility);
- Proper sequence to significantly reduce ongoing operating costs associated with energy and reagent consumption, unit maintenance, and on-stream time.

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**Delivering Results from Concept to Operation**

Our methodology begins with pilot tests in our laboratories, followed by a proposed design configuration and pre-investment estimate of overall project costs. We then work with your preferred EPC partner to design and deliver the project on-time, on-budget, and to specification, including training to operate the facility and troubleshoot both normal and intermittent challenges.

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**How can we make a difference for you?**

**KBR Ecoplanning Oy** has a long, rich history of creating value for our clients, with more than 50 years of service in evaporation and crystallization processes and hundreds of satisfied clients.