



PERP Report 2016S9: Phosphate and NPK Fertilizers

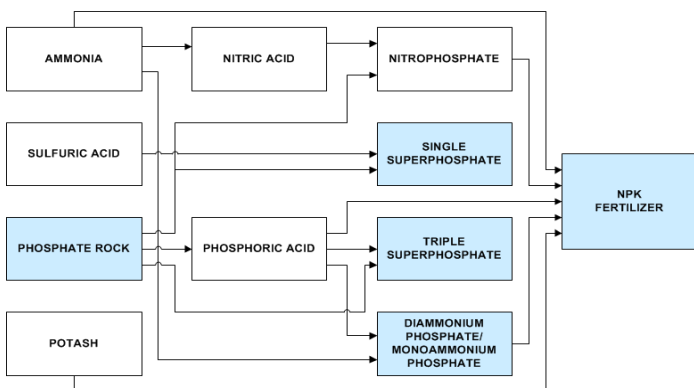
“Phosphate and NPK Fertilizers” is one in a series of reports published as part of the 2016 Process Evaluation/Research Planning (PERP) Program.

Report Overview

Phosphate fertilizers refer to products that supply the phosphorus needed to promote plant growth. This category includes ammonium phosphates and superphosphates, as well as more complex multinutrients known as NP and NPK fertilizers which, in addition to phosphorus, contain nitrogen and potassium.

Production of phosphate and NPK fertilizers tends to be concentrated in countries where phosphate rock is available. Long term access to low cost rock reserves is essential in order to be competitive.

SIMPLIFIED PHOSPHATE FERTILIZER VALUE CHAIN



This PERP report provides an overview of the technological, economic, and market aspects of phosphate and NPK fertilizers. The focus is on monoammonium phosphate (MAP), diammonium phosphate (DAP), and triple superphosphate (TSP), as these are the most important phosphate fertilizer products traded worldwide. Additionally, they are concentrated fertilizers that are widely used for direct application. The following issues are addressed in the report:

- What are the major technologies for phosphate and NPK fertilizer production? What are some of the recent technology developments in this area?
- How do the process economics for different fertilizers compare across different geographic regions?
- What will be the expected global consumption of ammonium phosphates and TSP by 2020?

Commercial Technologies

TSP is mainly produced via the Den process or via direct slurry granulation involving the reaction of phosphate rock and phosphoric acid. Ammonium phosphates (DAP and MAP) are also produced via the Direct Slurry Granulation Process using pipe reactors with ammonia and phosphoric acid as the key raw materials. NPK fertilizers are predominantly produced by the direct slurry granulation process by adding potassium salts in the granulation section. NPK fertilizers can also be produced by the nitrophosphate process, which involves burning ammonia to produce nitric acid, which is then used to acidulate phosphate rock.

This PERP report covers proven technologies by Casale, ESPINDESA, Incro, Jacos Engineering, and Yara Fertilizer Technology (which is the only technology that uses a nitrophosphate process).

Process Economics

Detailed cost of production estimates for different geographic regions are presented for:

- MAP via a conventional direct slurry granulation process
- DAP via a conventional direct slurry granulation process
- TSP via a conventional direct slurry granulation process
- NPK 16.5-16.5-16.5 via a conventional direct slurry granulation process
- NPK 16.5-16.5-16.5 via a conventional nitrophosphate process

Commercial Market Review

Global consumption of ammonium phosphates (MAP and DAP) and TSP, reached a combined total of 37 million tons in 2015. This PERP report highlights the historical and projected supply, demand, and trade of these phosphate fertilizers on a global and regional basis.

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