

Diammonium Phosphate

Diammonium phosphate (DAP) is the world's most widely used phosphorus (P) fertilizer. It is made from two common constituents in the fertilizer industry and it is popular because of its relatively high nutrient content and its excellent physical properties.

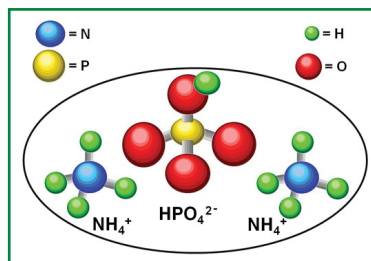
Production

Ammonium phosphate fertilizers first became available in the 1960s and DAP rapidly became the most popular in this class of products. It is formulated in a controlled reaction of phosphoric acid with ammonia, where the hot slurry is then cooled, granulated, and sieved. DAP has excellent handling and storage properties. The standard grade of DAP is 18-46-0 and fertilizer products with a lower nutrient content may not be labeled as DAP.

The inputs required to produce one ton of DAP fertilizer are approximately 1.5 to 2 tons of phosphate rock, 0.4 tons of sulfur (S), to dissolve the rock, and 0.2 tons of ammonia. Changes in the supply or price of any of these inputs will impact DAP prices and availability. The high nutrient content of DAP is helpful in reducing handling, freight, and application costs. DAP is produced in many locations in the world and is a widely traded fertilizer commodity.

Chemical Properties

Chemical formula:	$(\text{NH}_4)_2\text{HPO}_4$
Composition:	18% N 46% P_2O_5 (20% P)
Water solubility (20 °C):	588 g/L
Solution pH:	7.5 to 8



Agricultural Use

DAP fertilizer is an excellent source of P and nitrogen (N) for plant nutrition. It is highly soluble and thus dissolves quickly in soil to release plant-available phosphate and ammonium. A notable property of DAP is the alkaline pH that develops around the dissolving granule.

As ammonium is released from dissolving DAP granules, volatile ammonia can be harmful to seedlings and plant roots in immediate proximity. This potential damage is more common when the soil pH is greater than 7, a condition that commonly exists around the dissolving DAP granule. To prevent the possibility of seedling damage, care should be taken to avoid placing high concentrations of DAP near germinating seeds.

The ammonium present in DAP is an excellent N source and will be gradually converted to nitrate by soil bacteria, resulting in a subsequent drop in pH. Therefore, the rise in soil pH surrounding DAP granules is a temporary effect. This initial rise in soil pH neighboring DAP can influence the micro-site reactions of phosphate and soil organic matter.

Management Practices

There are differences in the initial chemical reaction between various commercial P fertilizers in soil, but these dissimilarities become minor over time (within weeks or months) and are minimal as far as plant nutrition is concerned. Most field comparisons between DAP and monoammonium phosphate (MAP) show only minor or no differences in plant growth and yield due to P source with proper management.

Non Agricultural Uses

DAP is used in many applications as a fire retardant. For example, a mixture of DAP and other ingredients can be spread in advance of the fire to prevent a forest from burning. It then becomes a nutrient source after the danger of fire has passed. DAP is used in various industrial processes, such as metal finishing. It is commonly added to wine to sustain yeast fermentation and to cheese to support cheese cultures.

