WHAT IS A "CHEMICAL" FERTILIZER?

Multi-nutrient fertilizers are given a numerical designation consisting of three numbers. These numbers represent respectively the content in terms of percent by weight of nitrogen (N), Phosphate (P_2O_5), and potash (K_2O).

NITROGEN FERTILIZERS

Anhydrous Ammonia (Ammonia Gas) – NH_3

This is the base material from which most other N containing fertilizers are made.

Nitrogen from the atmosphere (78% N) and Hydrogen (from natural gas) in the presence of a catalyst at a temperature of 400-500º C and a pressure of 2, 200 psig in a centrifugal compressor plant. Contains 82% nitrogen.

Nitrogen from the atmosphere is virtually limitless; Hydrogen alternative sources include water, coal, oven gasses, and naphtha.

Aqua Ammonia-Anhydrous ammonia dissolved in water

Contains 20% nitrogen – Must be injected below the soil surface to minimize volatilization of ammonia gas.

Ammonium nitrate – $NH_4\ NO_3$

Anhydrous ammonia and nitric acid. Nitric acid is produced by combining NH_3 and air and a catalyst, usually platinum. Concentrated and coated to 33.5% to 34% N.

Ammonium nitrate lime – Ammonium nitrate plus powdered limestone usually 26% N.

Ammonium sulfate – $(NH_4)_2\ SO_4$

Anhydrous ammonia and sulfuric acid and crystallization process. Contains 21% N and 26% sulfur.

Ammonium Nitrate – Sulfate – Anhydrous ammonia and nitric and sulfuric acid.

Calcium Nitrate – $Ca\ (NO_3)_2$ – Nitric acid plus crushed limestone. Contains 15.5% N.

Urea - $CO\ (NH_2)_2$ – Amino nitrogen and carbon monoxide at a temperature of 170º to 210º C and a pressure of 2,500 to 6,000 psig. Contains 46% N.

Sodium Nitrate - $Na\ (NO_3)_2$ - Nitrate nitrogen and Sodium mined from natural deposits in Chile.

PHOSPHATE FERTILIZERS

Phosphate rock deposits are the basic sources of all phosphate materials. Rock phosphate prior to benefication has a phosphate content of 14-35%.

Benefication involves mill grinding to <200 mesh in size, wet screening, hydroseparation and floatation to form a product containing 31-33% P_2O_5, very little is soluble or available to plants unless applied to acid soils with pH < 6.0.

The concentrated phosphate rock is then treated with sulfuric acid to produce ordinary superphosphate (0-20-0) or phosphoric acid to produce triple superphosphate. Single or ordinary superphosphate contains 18 to 20% available P_2O_5 along with gypsum-calcium sulfate ($CaSO_4$) and compounds of Fe (iron), Al (Aluminum, Ca (Calcium), and Mg (Magnesium).

Ammonium phosphate – anhydrous ammonia plus ordinary superphosphate (liquid) to form 16-20-0 and other low N-P fertilizers or anhydrous ammonia plus phosphoric acid to form more concentrated fertilizers, i.e., 11-48-0, 16-48-0, and 18-46-0.

POTASH FERTILIZERS

Potassium is mined as a natural occurring salt of chloride, sulfate or nitrate. In conventional shaft mining the potassium is brought to the surface as sylvanite. Sylvanite is interlocked crystals of KCl and NaCl. These are separated during a selective floatation process.

Alternative sources of potash include natural brine deposits.

MICRO NUTRIENTS

Inorganic nutrients such as Calcium (Ca), Iron (Fe), Magnesium (Mg), Manganese (Mn), Zinc (Zn), and Copper (Cu) commonly occur as sulfates. Synthetic chelates are compounds, which combines the micro nutrient (metal) ion with a ring structure of a chelating agent, which reduce temporarily, absorption by soil and increase plant availability. Many naturally occurring micronutrients are prepared from bi-products of the wood pulp industry or seaweed products. Most are unstable and readily broken down by microorganisms in the soil.

Boron (B), Molybdenum (Mo) and Chlorine (Cl) are necessary in small quantities by plans but can easily be added in excess if more than a few ounces per acre are applied.

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