

Ammonia

► WHAT IS AMMONIA?

Most of the ammonia in the environment comes from the natural breakdown of manure, dead plants and animals. Man-made sources of ammonia include fertilizers, power plants, mobile sources and other manufacturing emissions. At room temperature, ammonia is a colorless, pungent-smelling gas and lighter than air. At minus 28 degrees Fahrenheit (-33 degrees Celsius), ammonia becomes a liquid. Ammonia easily dissolves in water, and in this form is known as liquid ammonia, aqueous ammonia or ammonia solution. In water, most of the ammonia changes to ammonium ions (NH_4^+).

► HOW IS AMMONIA CONVERTED INTO A FERTILIZER?

Although almost 80 percent of the earth's atmosphere is comprised of nitrogen, it is chemically and biologically unusable in this form. However, using a method called the Haber-Bosch process, nitrogen is captured from the air and converted into a form that can be used by growing plants. Ammonia in this form is known as ammonia gas or anhydrous ("without water") ammonia. Ammonia NH_3 is the foundation for all nitrogen (N) fertilizers.

► WHY IS AMMONIA IMPORTANT?

Nitrogen is an essential element and a much needed source of nutrition for growing plants. Ammonia has the highest N content of any commercial fertilizer. It can be directly applied to soil as a plant nutrient or converted into a variety of common N fertilizers.

► HOW IS AMMONIA APPLIED AS A FERTILIZER?

In the storage tank, NH_3 is a pressurized liquid. When applied directly to the soil, it immediately becomes a vapor. Ammonia is always placed at least 10 to 20 centimeters below the soil surface to prevent its loss as a vapor back to the atmosphere. Various types of tractor-drawn knives and shanks are used to place the NH_3 in the correct location. Ammonia will rapidly react with soil water to form ammonium NH_4^+ . Ammonia is sometimes dissolved in water to produce "aqua ammonia," a popular liquid N fertilizer. Aqua ammonia does not need to be injected as deeply as anhydrous ammonia, which provides benefits during field application and has fewer safety considerations.

AMMONIA SAFETY

Handling ammonia requires careful attention to safety. Both at storage facilities and during field application, appropriate personal protective equipment must be used. Since it is water soluble, free ammonia will rapidly react with body moisture in the lungs and eyes, causing severe damage.

