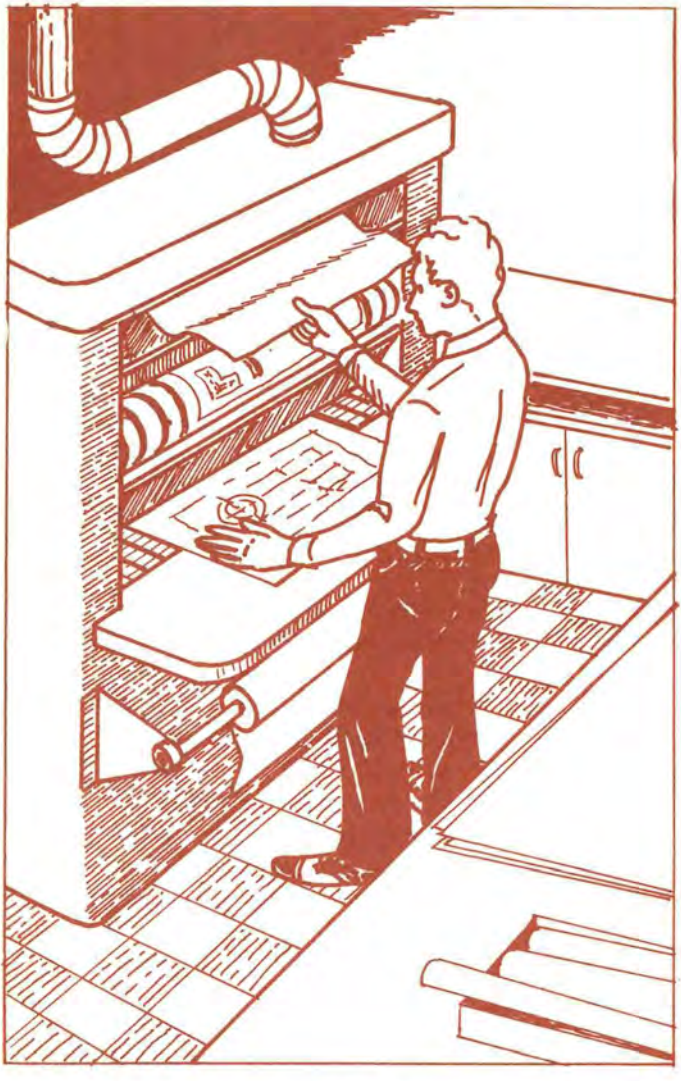
WORKING WITH
Ammonia



U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
Public Health Service
Center for Disease Control
National Institute for Occupational
Safety and Health

WORKING WITH AMMONIA

What Ammonia Is

Ammonia is a clear, pungent, light, and slightly reactive gas that is readily condensed to the liquid form. Some ammonia is produced by most animals and plants; consequently it is present in small amounts everywhere—in the air, water, and soil.

Ammonia is used by many industries and can be manufactured by several methods; the gas produced can then be compressed or refrigerated for shipping and storage as a liquid. Ammonia is supplied to commerce and industry in two forms: anhydrous (without water), which is the pure liquified gas, and aqua ammonia, which is a solution of the gas in water.

How Ammonia Is Used

Ammonia is an important ingredient of many nitrogen-containing compounds. Great quantities are used in manufacturing fertilizers; it is also used in manufacturing nitric acid, acetylene, urea, explosives, synthetic fibers, and synthetic resins.

Chemical solutions containing ammonia are used in manufacturing paper products, photographic film, dyes, inks, glues, and medicines.

Ammonia itself is used as the heat-transfer agent in commercial refrigeration and ice-making systems. It is essential in making blueprints by the diazo process and is an ingredient of cleaning solutions.

How Ammonia Affects the Body

Ammonia is not, strictly speaking, a poison and has no additive effects on the human body from repeated exposure. However, this gas in small concentrations in the air can be extremely irritating to the eyes, throat, and breathing passages.

Gaseous ammonia in greater concentrations than that resulting in irritation produces convulsive coughing that, by preventing breathing, can result in suffocation in a short time. High concentrations in the air can also dissolve in the skin's moisture and result in a corrosive action on the skin. Fortunately, because ammonia's intensive odor is pungent, penetrating and very offensive, few people can tolerate concentrations great enough to be seriously injurious to health.

Anhydrous and aqua ammonia have the additional hazard that they are both caustics to the skin and eye—contact with the skin produces first and second degree burns similar to alkali burns and eye contact produces burning and possible blindness. The anhydrous ammonia causes more severe burns not only because it joins with skin moisture, but also because burns result from the freezing produced by its rapid evaporation. Another result of contact with the anhydrous form is that it dries the skin, which has serious consequences.

Although not usually regarded as a combustible material, ammonia gas in high concentrations in the air will burn. The fire hazard from ammonia is increased by the presence of oil or other combustible materials; good housekeeping practices will reduce the possibility of ammonia fires.

Another danger is that the ammonia will combine with silver oxide or mercury to form a fulminate, an unstable explosive compound.

Controlling Ammonia Hazards

The hazards of using ammonia in industrial processes are greatly reduced by having enough ventilation where people work. Getting employees out in the event of an emergency is aided by well-marked exits and strategically located emergency gas masks.

Other emergency equipment should be installed in areas where either anhydrous or aqua ammonia could possibly be splashed on the skin or face. This should include full-flood emergency showers, as well as face-wash and eye-wash stations.

In Event of Emergency

If anhydrous or aqua liquid ammonia leaks or is spilled, any worker who might possibly come into contact with the liquid should use an approved full-face gas mask with ammonia gas canister or an airline respirator equipped with a full facepiece or hood. He should also wear protective clothing and gloves.

Any worker who suffers burns or the effects of ammonia inhalation during the emergency should be examined by the plant doctor.

Management Responsibilities

The control of ammonia hazards requires

that management provide and maintain the safety features noted: adequate ventilation, well-marked emergency exits, emergency masks, emergency showers and face sprays, and full-face respirators. Also, management should maintain strict engineering and process control and establish an intensive safety program. Each worker should be trained in the proper use and limitations of his protective equipment and in his responsiblities in the event of an emergency.

Employee Responsibilities

Each employee must be aware of the hazards to health resulting from working with ammonia and of how he can reduce the hazards by safe work practices and by obeying safety precautions. In addition, the employee should:

1. Avoid skin and eye contact with ammonia.
2. Use personal protective equipment where appropriate.
3. Know where emergency equipment is kept in his area and how to use it.
4. Make sure that the exhaust and ventilation equipment is functioning during work periods.
5. Report to his supervisor any unusually strong odor of ammonia in his area.
6. Report to the plant nurse or doctor any burn from contact with ammonia.

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