INFORMATION PACKAGE OF THE DIAMMONIUM PHOSPHATE (DAP) REACTION SECTION

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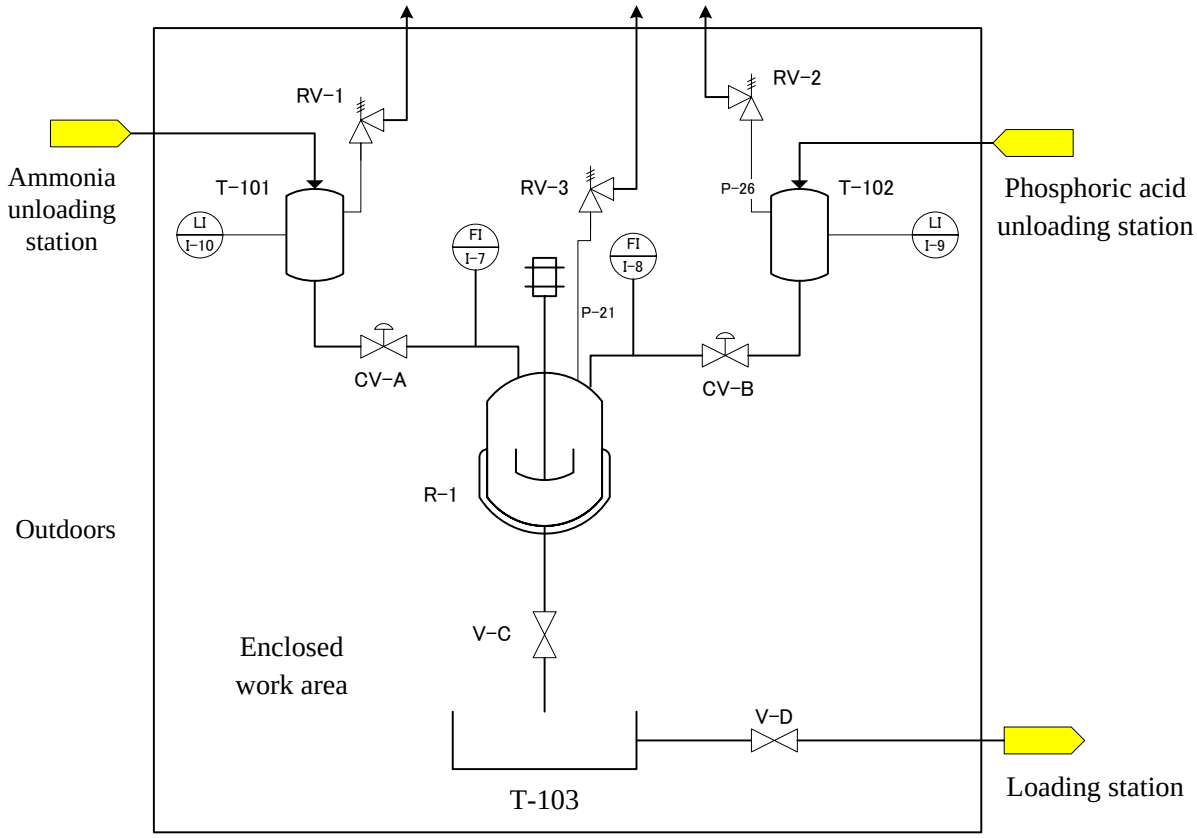
GENERAL PROCESS DESCRIPTION

A manufacturing facility located in Mizushima produces diammonium phosphate (DAP), a nonhazardous product using a continuous process. In the reaction section, phosphoric acid solution and an ammonia solution are provided through flow control valves to an agitated reactor. The ammonia and phosphoric acid react to form DAP. The DAP flows from the reactor to an open-top storage tank. Relief valves are provided on the storage tanks and the reactor with discharges to outside of the enclosed work area.

If too much phosphoric acid is fed to the reactor (compared to the ammonia feed rate), an off-specification product is created, but the reaction is safe. If the ammonia and phosphoric acid flow rates both increase, the rate of energy release may accelerate, and the reactor, as designed, may be unable to handle the resulting increase in temperature and pressure. If too much ammonia is fed to the reactor (as compared to the normal phosphoric acid feed rate), unreacted ammonia may carry over to the DAP storage tank. Any residual ammonia in the DAP tank will be released into the enclosed work area, causing personnel exposure. Ammonia detectors and alarms are provided in the work area.



Main equipment (Tag No.)	Description
T-1	Ammonia solution storage tank
T-2	Phosphoric acid storage tank
T-3	DAP storage tank
R-1	DAP reactor

PURPOSE, SCOPE AND OBJECTIVES

Purpose: The purpose of the study is to evaluate safety of the process after plant modification. The concentration of ammonia in the ammonia solution has been increased to require less frequent purchase of ammonia. The relative flow rates to the reactor have been adjusted for the higher ammonia concentrations. A new interior wall was constructed in the processing area.

Scope: The process considered includes the lines from the unloading stations of ammonia and phosphoric acid, the DAP reactor, the ammonia storage tank, the phosphoric acid storage tank, the DAP storage tank, the charging lines (where valves A and B are located), the DAP line between the DAP storage tank and the DAP loading stations.

External events to be considered are: earthquakes, typhoons

Objectives: Hazards to be considered are release of ammonia to the atmosphere. Consequences to be addressed are personnel health effects and property damage.

MATERIAL SAFETY DATA SHEET FOR AMMONIA

Synonyms: Ammonia Aqueous; Aqua Ammonia; Ammonia TS
CAS No.: Not applicable to mixtures.
Molecular Weight: 58.179
Chemical Formula: NH_3+H_2O

Physical State: Liquid
pH: 12-14

Hazard Type: Irritant and corrosive to skin, eye, respiratory tract and mucous membranes. May cause severe burns, eye and lung injuries. Skin and respiratory related diseases aggravated by exposure. Not recognized by OSHA as a carcinogen. Not listed in the National Toxicology Program annual report. Not listed as a carcinogen by the International Agency for Research on Cancer..

Potential Health Effects
Inhalation: Severe irritation to nose, throat and lungs causing headaches, coughing, severe lung congestion, breathing difficulty, convulsion or shock. Requires medical attention.
Ingestion: May cause corrosion to the esophagus and stomach with perforation and peritonitis. Ingestion causes burning pain in mouth, throat, stomach, and thorax, constriction of throat, and coughing. This is soon followed by vomiting of blood or by passage of loose stools containing blood. Ingestion of 3-4 ml may be fatal. Requires medical attention.
Skin Contact: Causes smarting of the skin and first-degree burns on short exposure. May cause second-degree burns on long exposure. Effects limited to local effects. Requires medical attention.
Eye Contact: Overexposure can severely irritate and burn the skin or eye causing permanent damage. Requires medical attention.

Fire: Not considered to be a fire hazard.

Explosion: Closed containers exposed to extreme heat may develop pressure. Combustion of released ammonia may form nitrogen oxides. Closed containers exposed to heat may explode. Contact with mercury, chlorine, bromine, iodine, calcium, silver oxide, or hypochlorite can form explosive compounds.

Ventilation: Local exhaust is essential. Spark-proof fans desirable with mechanical ventilation. Ducts should be located at ceiling level and lead upwards to the outside. Local exhaust must be adequate to reduce ammonia concentration below 25 ppm.

Airborne exposure limits

OSHA Permissible Exposure Limit (PEL): 50 ppm (TWA)

Toxicological information: Oral rat, LD50: 350 mg/kg

NFPA Ratings: Health: 3 Flammability: 1 Reactivity: 0

Damage to environment: Harmful to aquatic life in very low concentrations. May be dangerous if it enters water intakes.

Protection: Stop the flow of liquid. Use water to keep fire exposed containers cool and protect operators. Can be neutralized with dilute phosphoric or sulfuric acids.