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Product Information

AMMONIUM HYDROXIDE, ACS REAGENT

Product Code **22,122-8**

Storage Temperature RT

Exact replacement for Product Code A 6899

CAS #: 1336-21-6

Synonyms: ammonia solutions; ammonia water; "spirit of Hartshorn"¹

Product Description

Appearance: Clear, colorless liquid with an intense pungent odor

Molecular formula: $\text{NH}_4\text{OH} = \text{NH}_3 \text{ in } \text{H}_2\text{O}$

Molecular weight: 35.05

Concentration of solution: Approximately 28-30% NH_3 in water, 14.8 M

Density at 25 °C = approximately 0.90 g/mL.¹

A 28% solution freezes at -77 °C.^{2a} (Ammonia gas itself melts at -77.7 °C, boiling at -33.3 °C at standard pressure.)^{2c}

$\text{pK}_b = 4.75$ ^{2b}

Ammonia is one of the top ten inorganic chemicals produced in the United States; annual production is approximately 35 billion pounds.³

Ammonia is used as a fertilizer directly or in the manufacture of fertilizers, explosives and a huge range of materials. Ammonium hydroxide is widely used as a buffer (as ammonium acetate or as ammonium carbonate). These buffers are volatile and can be removed from protein solutions by lyophilization, leaving salt-free solids.

As an ACS Reagent (American Chemical Society), this product meets the requirements.⁴

Preparation Instructions

As noted above, ammonia gas is extremely soluble in water, and solutions are chemically stable, but decrease in concentration if left open to the air. Frequently opened solutions should probably be stored at 2-8 °C. Saturation concentrations in water:¹

at 0 °C 47% (w/v) ammonia

at 15 °C 38%

at 20 °C 34%

at 30 °C 28%

at 50 °C 18%.

Storage/Stability

Ammonium hydroxide has a shelf-life of two years if stored at room temperature, but should be stored tightly sealed in a vented cabinet away from acids. Over time, the concentration may decrease due to evaporation of the gas from the solution. For critical applications, it may be advisable to store frequently opened containers at 2-8 °C.

The standard solution is chemically stable at or below 25 °C, but it is not uncommon to observe a release of pressure when a bottle is opened for the first time.

Although ammonia and ammonium hydroxide are generally not considered flammable, a mixture of anhydrous ammonia gas and air can explode if ignited under favorable conditions.¹

References

1. *Merck Index*, 11th ed., #510, #512, 513 (1989).
- 2a. *Handbook of Chem. and Physics*, 74th ed. (CRC Press, 1994), p. 4/38.
- 2b. *Handbook of Chem. and Physics*, 74th ed. (CRC Press, 1994), p. 8/45.
- 2c. *Handbook of Chem. and Physics*, 74th ed. (CRC Press, 1994), p. 6/56.
3. *Chemical and Engineering News*, June 24, p. 40 (1996).
4. *Reagent Chemicals*, 8th ed., (American Chemical Society Press, 1993), pp. 133-135.

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