Ammonium Phosphate

1 Nonproprietary Names

USP-NF: Ammonium Phosphate

2 Synonyms

DAP; diammonium hydrogen orthophosphate; diammonium hydrogen phosphate; diammonium phosphate; dibasic ammonium phosphate; E342; phosphoric acid; Phosphoric acid ammonium salt (1:2); secondary ammonium phosphate.

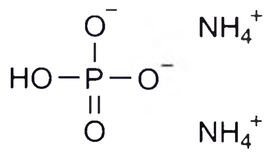
3 Chemical Name and CAS Registry Number

Diammonium hydrogen orthophosphate [7783-28-0]

4 Empirical Formula and Molecular Weight

$(NH_4)_2HPO_4$ 132.06

5 Structural Formula



6 Functional Category

Buffering agent.

7 Applications in Pharmaceutical Formulation or Technology

Dibasic ammonium phosphate is used as a buffering agent in oral pharmaceutical formulations. It has also been used to investigate the mineralization of hyaluronic acid nanoparticles as stable drug carriers.[1,2]

8 Description

Dibasic ammonium phosphate occurs as colorless or white granules or powder, with a saline, cooling taste.

9 Pharmacopeial Specifications

See Table I

Table I: Pharmacopeial specifications for dibasic ammonium phosphate.

Test	USP 40–NF 35 S1
Identification	+
Chlorides	0.03%
Sulfates	0.15%
Arsenic	≤3 ppm
Heavy metals	≤10 ppm
pH (1 in 100 solution)	7.6–8.2
Assay	96.0–102.0%

10 Typical Properties

Density 1.619 g/cm^3

Melting point 155°C with decomposition;[3–5] also reported as 185°C with decomposition,[6] and 235°C with decomposition at 280°C and above.[7]

Solubility Freely soluble in water. Practically insoluble in acetone and ethanol.

11 Stability and Storage Conditions

Dibasic ammonium phosphate is stable under normal temperatures and pressures although it gradually loses about 8% NH_3 on exposure to air.[7] It is hygroscopic and tends to cake on storage.[6] Store in airtight containers in a cool, dry, well-ventilated area.

12 Incompatibilities

Dibasic ammonium phosphate is incompatible with strong oxidizing agents, strong acids, strong bases, sodium hypochlorite, and magnesium.[4,5]

13 Method of Manufacture

Dibasic ammonium phosphate is produced commercially by reacting ammonia with phosphoric acid.[8] The grade used medicinally is 98-99% pure.

14 Safety

Dibasic ammonium phosphate in pure form can cause skin and eye irritation, and may cause respiratory irritation. Ingestion of large quantities may cause nausea, vomiting, diarrhoea, and abdominal cramps.[5]

When heated to decomposition, dibasic ammonium phosphate emits very toxic fumes of phosphorous oxides (PO_x), nitrogen oxides (NO_x) and NH_3.

LD_{50} (rabbit, skin): 7.95 g/kg[9]

LD_{50} (rat, oral): 3 g/kg;[10] 6.5 g/kg[4,9]

15 Handling Precautions

Observe normal precautions appropriate to the circumstances and quantity of the material handled.

Avoid direct or prolonged contact with skin and eyes, and avoid breathing dusts or vapors. Gloves, eye protection, a respirator, and other protective clothing should be worn.

16 Regulatory Status

GRAS listed. Dibasic ammonium phosphate is included in FDA Inactive Ingredients Database (oral tablets; sublingual and sustained action). Also included in the Canadian Natural Health Products Ingredients Database.

17 Related Substances

Ammonia solution; ammonium chloride; ammonium sulfate; monobasic ammonium phosphate.

Monobasic ammonium phosphate

Empirical formula $(NH_4)H_2PO_4$

Molecular weight 115.03

CAS number [7722-76-1]

Synonyms Ammonium dihydrogen phosphate; ammonium dihydrogen orthophosphate; phosphoric acid ammonium salt (1:1); ammonium biphosphate; monoammonium phosphate; primary ammonium phosphate.

Appearance Occurs as odorless white crystals, a crystalline powder, or granules.

Acidity/alkalinity pH 4.2 (0.2M aqueous solution)

Density 1.803 g/cm^3 at 19°C[6]