Sodium Acetate

1 Nonproprietary Names

BP: Sodium Acetate Trihydrate
JP: Sodium Acetate Hydrate
PhEur: Sodium Acetate Trihydrate
USP–NF: Sodium Acetate

2 Synonyms

Acetic acid, sodium salt; E262; natrii acetas trihydricus; sodium ethanoate; sodium ethanoate trihydrate.

3 Chemical Name and CAS Registry Number

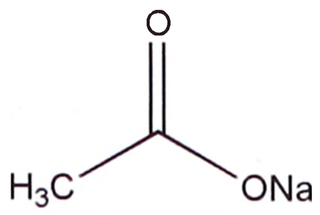
Sodium acetate anhydrous [127-09-3]
Sodium acetate trihydrate [6131-90-4]

4 Empirical Formula and Molecular Weight

$C_2H_3NaO_2$ 82.0 (for anhydrous)
$C_2H_3NaO_2 \cdot 3H_2O$ 136.1 (for trihydrate)

Note that the trihydrate is the material described in the JP XVII, PhEur 9.2 and USP 40–NF 35 S1, although the PhEur 9.2 is the only pharmacopeia that makes this explicit with the title of the monograph.

5 Structural Formula



6 Functional Category

Antimicrobial preservative; buffering agent; flavoring agent.

7 Applications in Pharmaceutical Formulation or Technology

Sodium acetate is used as part of a buffer system when combined with acetic acid in various intramuscular, intravenous, topical, ophthalmic, nasal, oral, otic, and subcutaneous formulations. It may be used to reduce the bitterness of oral pharmaceuticals.[1] It can be used to enhance the antimicrobial properties of formulations; it has been shown to inhibit the growth of *S. aureus* and *E. coli*, but not *C. albicans* in protein hydrolysate solutions.[2] It is widely used in the food industry as a preservative.[3]

8 Description

Sodium acetate occurs as colorless, transparent crystals or a white granular crystalline powder with a slight acetic acid odor.

9 Pharmacopeial Specifications

See Table I.

10 Typical Properties

Acidity/alkalinity pH = 7.5–9.0 (5% w/v aqueous solution)
Hygroscopicity The anhydrous and trihydrate sodium acetate are hygroscopic.
Melting point 58°C for trihydrate; 324°C for anhydrous.[4]
Solubility Soluble 1 in 0.8 in water, 1 in 20 in ethanol (95%).
Specific gravity 1.53
Spectroscopy
IR spectrum *see* Figure 1.
Raman spectrum *see* Figure 2.

Table I: Pharmacopeial specifications for sodium acetate.

Test	JP XVII	PhEur 9.2	USP 40–NF 35 S1
Identification	+	+	+
Description	+	–	–
Characters	–	+	–
Appearance of solution	+	+	–
Acid or alkali	+	–	–
pH	–	7.5–9.0	7.5–9.2
Insoluble matter	–	–	≤0.05%
Chloride	≤0.011%	≤200 ppm	≤350 ppm
Sulfate	≤0.017%	≤200 ppm	≤50 ppm
Heavy metals	≤10 ppm	–	≤10 ppm
Calcium and magnesium	+	≤50 ppm	+
Potassium	–	–	+
Arsenic	≤2 ppm	≤2 ppm	–
Iron	–	≤10 ppm	–
Reducing substances	+	+	–
Aluminum	–	≤0.2 ppm	≤0.2 ppm
Loss on drying			
Anhydrous	–	–	≤1.0%
Trihydrate	39.0–40.5%	39.0–40.5%	38.0–41.0%
Assay (dried basis)	≥99.5%	99.0–101.0%	99.0–101.0%

11 Stability and Storage Conditions

Sodium acetate should be stored in airtight containers.

12 Incompatibilities

Sodium acetate reacts with acidic and basic components. It will react violently with fluorine, potassium nitrate, and diketene.

13 Method of Manufacture

Sodium acetate is prepared by neutralization of acetic acid with sodium carbonate.

14 Safety

Sodium acetate is widely used in cosmetics, foods, and pharmaceutical formulations (*see* Section 18), and is generally regarded as a nontoxic and nonirritant material.

A short-term feeding study in chickens with a diet supplemented with 5.44% sodium acetate showed reduced growth rates that were attributed to the sodium content.[5] Sodium acetate is poisonous if injected intravenously, is moderately toxic by ingestion, and is an irritant to the skin and eyes.[6]

LD_{50} (rat, oral): 3.53 g/kg[6]
LD_{50} (mouse, IV): 0.34 g/kg[6]
LD_{50} (mouse, SC): 8.0 g/kg[6]

15 Handling Precautions

Observe normal precautions appropriate to the circumstances and quantity of material handled. Sodium acetate is a mild skin and eye