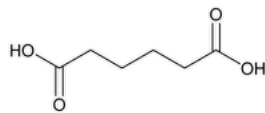


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Adipic Acid



$C_6H_{10}O_4$ 146.14
Hexanedioic acid;
1,4-Butanedicarboxylic acid CAS RN®: 124-04-9.

DEFINITION

Adipic Acid contains NLT 98.0% and NMT 102.0% of adipic acid ($C_6H_{10}O_4$), calculated on the dried basis.

IDENTIFICATION

- **A.** [SPECTROSCOPIC IDENTIFICATION TESTS \(197\)](#), *Infrared Spectroscopy*: 197K
- **B.** The retention time of the adipic acid peak of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the Assay.

ASSAY

• **PROCEDURE**

Solution A: 6.8 mL of 85% [phosphoric acid](#) in 4000 mL of [water](#)
Solution B: [Acetonitrile](#)
Mobile phase: See [Table 1](#).

Table 1

Time (min)	Solution A (%)	Solution B (%)
0.0	97	3
5.0	97	3
20.0	45	55
20.1	97	3

Re-equilibrate the column at the initial *Mobile phase* composition before the next injection.

Diluent: [Acetonitrile](#) and *Solution A* (3:97)
Standard solution: 0.5 mg/mL of [USP Adipic Acid RS](#) in *Diluent*
Sample solution: 0.5 mg/mL of Adipic Acid in *Diluent*

Chromatographic system
(See [Chromatography \(621\), System Suitability](#).)

Mode: LC
Detector: UV 209 nm
Column: 4.6-mm × 15-cm; 3-µm packing [L1](#)
Column temperature: 40°
Flow rate: 1.0 mL/min
Injection volume: 30 µL

System suitability
Sample: *Standard solution*
Suitability requirements
Tailing factor: NMT 2.0
Relative standard deviation: NMT 0.7%

Analysis**Samples:** *Standard solution* and *Sample solution*Calculate the percentage of adipic acid ($C_6H_{10}O_4$) in the portion of Adipic Acid taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times 100$$

 r_U = peak area of adipic acid from the *Sample solution* r_S = peak area of adipic acid from the *Standard solution* C_S = concentration of [USP Adipic Acid RS](#) in the *Standard solution* (mg/mL) C_U = concentration of Adipic Acid in the *Sample solution* (mg/mL)**Acceptance criteria:** 98.0%–102.0% on the dried basis**IMPURITIES**• [RESIDUE ON IGNITION \(281\)](#): NMT 0.1%• **LIMIT OF NITRATES****Standard stock solution:** 1.63 mg/mL of [potassium nitrate](#)**Standard solution:** Dilute 1 mL of the *Standard stock solution* with [water](#) to 10 mL. Dilute 1 mL of this solution with [water](#) to 50 mL to obtain a solution containing 2 µg/mL of nitrate.**Sample solution:** Transfer 5 g of Adipic Acid to a 50-mL volumetric flask. Dissolve in [water](#), with heating, and dilute with [water](#) to volume.Allow to cool and crystallize and then pass through a sintered-glass filter. Wash the filter with [water](#), and collect the filtrate and washings until a volume of 50 mL is obtained. [NOTE—This solution is also to be used for *Chloride*, *Sulfate*, and *Iron*.]**Control:** 2 mg/L of [potassium permanganate](#)**Analysis:** Transfer 1.0 mL of the *Sample solution*, 1.5 mL of the *Standard solution*, and 1 mL of [water](#) (blank) to three separate flasks. To each flask add 2 mL of [ammonium hydroxide](#), 0.5 mL of 10 mg/mL [manganese sulfate](#), and 1 mL of 10 mg/mL [sulfanilamide](#), and dilute each solution with [water](#) to 20 mL. Add 100 mg of [zinc](#) powder to each of the three flasks, and cool in an ice bath for 30 min, shaking the solutions periodically. Separately filter 10 mL of each solution, cool in an ice bath, and then add 2.5 mL of [hydrochloric acid](#) and 1 mL of 10 mg/mL of [naphthylethylenediamine dihydrochloride](#). Allow the solutions to stand at room temperature for 15 min.**System suitability:** The test is invalid if the concomitantly prepared blank solution is darker than the *Control*.**Acceptance criteria:** The color of the solution containing the *Sample solution* is not darker than the concomitantly prepared solution containing the *Standard solution* (NMT 30 ppm).• [CHLORIDE AND SULFATE \(221\)](#), *Chloride***Sample:** A 5-mL portion of the *Sample solution* from *Limit of Nitrates***Analysis:** Proceed as directed in the chapter.**Acceptance criteria:** The *Sample* shows no more chloride than a corresponding 0.14-mL portion of 0.020 N hydrochloric acid (NMT 0.02%).• [CHLORIDE AND SULFATE \(221\)](#), *Sulfate***Sample:** A 5-mL portion of the *Sample solution* from *Limit of Nitrates***Analysis:** Proceed as directed in the chapter.**Acceptance criteria:** The *Sample* shows no more sulfate than a corresponding 0.26-mL portion of 0.020 N sulfuric acid (NMT 0.05%).• [IRON \(241\)](#)**Sample:** A 10-mL portion of the *Sample solution* from *Limit of Nitrates***Analysis:** Proceed as directed in the chapter.**Acceptance criteria:** NMT 10 ppm**Change to read:**• **RELATED SUBSTANCES****Solution A, Solution B, Mobile phase, Diluent, and Chromatographic system:** Proceed as directed in the Assay.**Standard solution:** 5 µg/mL of [USP Adipic Acid RS](#)**Sample solution:** 5 mg/mL of Adipic Acid in *Diluent***System suitability****Sample:** *Standard solution*[NOTE—See [Table 2](#) for the relative retention times.]**Table 2**

Compound Name	Relative Retention Time	Relative Response Factor
Maleic acid	0.31	1.40