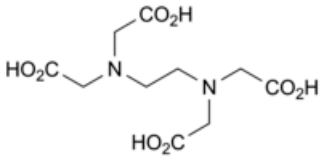
Edition: BP 2025 (Ph. Eur. 11.6 update)

Edetic Acid

General Notices

(Ph. Eur. monograph 1612)



$C_{10}H_{16}N_2O_8$ 292.2 *60-00-4*

Action and use

Chelating agent.

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DEFINITION

(Ethylenedinitrilo)tetraacetic acid.

Content

98.0 per cent to 101.0 per cent.

CHARACTERS

Appearance

White or almost white, crystalline powder or colourless crystals.

Solubility

Practically insoluble in water and in ethanol (96 per cent). It dissolves in dilute solutions of alkali hydroxides.

IDENTIFICATION

First identification: A.

Second identification: B, C.

A. Infrared absorption spectrophotometry (*2.2.24*).

Preparation Discs, after drying the substance to be examined in an oven at 100-105 °C for 2 h.

Comparison *sodium edetate R*, treated as follows: dissolve 0.25 g of *sodium edetate R* in 5 mL of *water R*, add 1.0 mL of *dilute hydrochloric acid R*. Filter, wash the residue with 2 quantities, each of 5 mL, of *water R* and dry the residue in an oven at 100-105 °C for 2 h.

B. To 5 mL of *water R* add 0.1 mL of *ammonium thiocyanate solution R* and 0.1 mL of *ferric chloride solution R1* and mix. The solution is red. Add 0.5 mL of solution S (see Tests). The solution becomes yellowish.
C. To 10 mL of solution S add 0.5 mL of *calcium chloride solution R*. Make alkaline to *red litmus paper R* by the addition of *dilute ammonia R2* and add 3 mL of *ammonium oxalate solution R*. No precipitate is formed.

TESTS

Solution S

Dissolve 5.0 g in 20 mL of *dilute sodium hydroxide solution R* and dilute to 100 mL with *water R*.

Appearance of solution

Solution S is clear (*2.2.1*) and colourless (*2.2.2, Method II*).

Impurity A

Liquid chromatography (*2.2.29*). *Carry out the test protected from light.*

Solvent mixture Dissolve 10.0 g of *ferric sulfate pentahydrate R* in 20 mL of *0.5 M sulfuric acid* and add 780 mL of *water R*. Adjust to pH 2.0 with *1 M sodium hydroxide* and dilute to 1000 mL with *water R*.

Test solution Dissolve 0.100 g of the substance to be examined in 1.0 mL of *1 M sodium hydroxide* and dilute to 25.0 mL with the solvent mixture.

Reference solution Dissolve 40.0 mg of *nitrilotriacetic acid R* in the solvent mixture and dilute to 100.0 mL with the solvent mixture. To 1.0 mL of the solution add 0.1 mL of the test solution and dilute to 100.0 mL with the solvent mixture.

Column:

— *size*: *l* = 0.10 m, Ø = 4.6 mm,

— *stationary phase*: *graphitised carbon for chromatography R* (5 µm).

Mobile phase Dissolve 50.0 mg of *ferric sulfate pentahydrate R* in 50 mL of *0.5 M sulfuric acid* and add 750 mL of *water for chromatography R*. Adjust to pH 1.5 with *0.5 M sulfuric acid* or *1 M sodium hydroxide*, add 20 mL of *ethylene glycol R* and dilute to 1000 mL with *water for chromatography R*.

Flow rate 1.0 mL/min.

Detection Spectrophotometer at 273 nm.

Injection 20 µL; filter the solutions and inject immediately.

Run time 4 times the retention time of the iron complex of impurity A.

Retention time Iron complex of impurity A = about 5 min; iron complex of edetic acid = about 10 min.

System suitability Reference solution:

— *resolution*: minimum 7.0 between the peaks due to the iron complex of impurity A and the iron complex of edetic acid,

— *signal-to-noise ratio*: minimum 50 for the peak due to impurity A.

Limit:

— *impurity A*: not more than the area of the corresponding peak in the chromatogram obtained with the reference solution (0.1 per cent).

Chlorides (*2.4.4*)

Maximum 200 ppm.

To 10 mL of solution S add 8 mL of *nitric acid R* and stir for 10 min. A precipitate is formed. Filter and wash the filter with *water R*. Collect the filtrate and the washings and dilute to 20 mL with *water R*. Dilute 10 mL of this solution to 15 mL with *water R*.

Iron (*2.4.9*)

Maximum 80 ppm.

Dilute 2.5 mL of solution S to 10 mL with *water R* and add 0.25 g of *calcium chloride R* before adding the *thioglycollic acid R*. Allow to stand for 5 min. Also add 0.25 g of *calcium chloride R* to the standard.

Sulfated ash (*2.4.14*)

Maximum 0.2 per cent, determined on 1.0 g.

ASSAY

Dissolve 0.250 g in 2.0 mL of *dilute sodium hydroxide solution R* and dilute to 300 mL with *water R*. Add 2 g of *hexamethylenetetramine R* and 2 mL of *dilute hydrochloric acid R*. Titrate with *0.1 M zinc sulfate* using about 50 mg of *xylenol orange triturate R* as indicator.

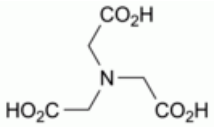
1 mL of *0.1 M zinc sulfate* corresponds to 29.22 mg of $C_{10}H_{16}N_2O_8$.

STORAGE

Protected from light.

IMPURITIES

Specified impurities *A.*



A. nitrilotriacetic acid.

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