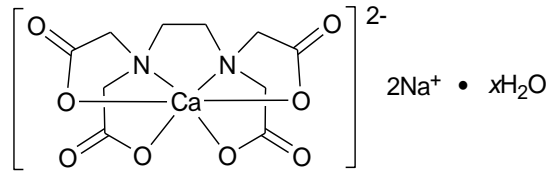


Calcium Disodium Edetate

Calcium Disodium Ethylenediaminetetraacetate.



$C_{10}H_{12}CaN_2Na_2O_8 \cdot x H_2O$

Disodium

[[N,N'-ethane-1,2-diylbis[N-(carboxymethyl)glycinato]](4-)-N,N',O,O',O'',O''']calciate(2-) hydrate **[23411-34-9]**

Calcium Disodium Edetate contains not less than 98.0 % and not more than 102.0 % of $C_{10}H_{12}CaN_2Na_2O_8$ (374.27), calculated on the anhydrous basis.

Identification

(1) Evenly distribute 1.00 g of the substance to be examined in the crucible. Dry at about 105°C for 1 h, gently at first, and gradually increase the temperature to 600°C ± 25°C, and ignite in a muffle furnace, allowing the crucible to cool in a desiccator after each ignition. Flames should not be produced at any time during the procedure. After every ignition, compact the substance blown up to the sides of the crucible during ignition with a glass staff. The ignition is repeated until a full white color is achieved. If after prolonged ignition the ash still contains black particles, take up with hot water, filter through an ashless filter paper and ignite the residue and the filter paper. Combine the filtrate with the ash, carefully evaporate to dryness and ignite. Repeat the ignition until a full white color is obtained.

Take up 100 mg of residue in 20 mL of water and add 1.0 mL of 3 M Hydrochloric acid. The substance dissolves.

Add about 0.1 mL of methyl red and neutralize with 6 M ammonium hydroxide. Add 3 M hydrochloric acid, until the solution is acid to the indicator. Upon the addition of ammonium oxalate TS (about 0.6 mL), the solution becomes opalescent. Separate the suspension into equal portions. The addition of 6 M acetic acid (about 0.5 mL) to the half of this suspension does not affect the clearness of the solution, but it becomes clear when 3 M hydrochloric acid (about 1 mL) is added to the other half.

(2) Dissolve 0.5 g in 10 mL of water and add 10 mL of potassium pyroantimonate TS: a white, crystalline precipitate is formed. The formation of the precipitate is accelerated by rubbing the inside wall of the test tube with a glass rod.

(3) Infrared absorption spectrophotometry

Record the infrared absorption spectrum of Calcium Disodium Edetate and compare with the Reference Spectrum or the spectrum obtained with the Reference Standard: the transmission minima correspond in position and relative size.

pH Dissolve 2.0 g in water to make 10 mL: the pH of this solution is between 6.5 and 8.0.

49

50 **Purity**

51 (1) Chloride—Dissolve 0.70 g in water to make 20 mL. Add 30 mL of dilute nitric acid to
52 this solution, allow to stand for 30 minutes and filter. To 10 mL of the filtrate add water
53 to make 50 mL, and perform the test using this solution as the test solution. Prepare
54 the control solution using 0.40 mL of 0.01 M hydrochloric acid Standard Solution for
55 Volumetric Analysis, add 6 mL of dilute nitric acid and water to make 50 mL. Filter both
56 solutions if necessary.

57 Add 1 mL of a 17 g/L solution of silver nitrate to the test solution and the control
58 solution. Allow to stand protected from light for 5 min. Any opalescence in the test
59 solution is not more intense than that in the control solution (not more than 0.10 %).

60

61 (2) Disodium edetate—Dissolve 1.00 g in 50 mL of water, add 5 mL of pH 10.7
62 ammonia–ammonium chloride buffer solution and titrate with 0.01 M magnesium
63 chloride Standard Solution for Volumetric Analysis until the color of the solution
64 changes from blue to red-violet (indicator: 0.04 g of eriochrome black T—Sodium
65 chloride indicator): it is not more than 3.0 mL (not more than 1.0 %).

66

67 (3) Nitrilotriacetic acid—Conduct this procedure using light-resistant vessels. Dissolve
68 0.100 g of Calcium Sodium Edetate in diluting solution to make exactly 25 mL, and use
69 this solution as the sample solution. Separately, dissolve 40.0 mg of nitrilotriacetic acid
70 in diluting solution to make exactly 100 mL. Pipet 1 mL of this solution, add 0.1 mL of
71 the sample solution, then add diluting solution to make exactly 100 mL, and use this
72 solution as the standard solution. Filter the sample solution and standard solution, and
73 perform the test with exactly 20 μ L each of the sample solution and standard solution as
74 directed under Liquid Chromatography according to the following conditions, and
75 determine the peak areas, A_T and A_S , of nitrilotriacetic acid in each solution: A_T is not
76 larger than A_S (not more than 0.1 %).

77

78 Diluting solution: Dissolve 10.0 g of iron (III) sulfate pentahydrate in 20 mL of 0.5 M
79 solution of sulfuric acid and 780 mL of water, adjust to pH 2.0 with 1 M solution of
80 sodium hydroxide, and add water to make 1000 mL.

81 Operating conditions—

82 Detector: An ultraviolet absorption photometer (wavelength: 273 nm).

83 Column: A stainless steel column 4.6 mm in inside diameter and 10 cm in length,
84 packed with graphite carbon for liquid chromatography (mean pore size: 25 nm, specific
85 surface: 120 m²/g, 5 μ m in particle diameter).

86 Column temperature: A constant temperature of about 40°C.

87 Mobile phase: Dissolve 50.0 mg of iron (III) sulfate pentahydrate in 50 mL of 0.5 M
88 solution of sulfuric acid, add 750 mL of water, adjust to pH 1.5 with 0.5 M solution of
89 sulfuric acid or 1 M solution of sodium hydroxide, and add 20 mL of ethylene glycol and
90 water to make 1000 mL.

91 Flow rate: 1.0 mL per minute (the retention time of nitrilotriacetic acid is about 5
92 minutes).

93 System suitability—

94 Test for required detectability: When perform the test with 20 μ L of the standard
95 solution under the above operating conditions, the SN ratio of the peak of nitrilotriacetic
96 acid is not less than 50.

97 System performance: When the procedure is run with 20 μ L of the standard solution
98 under the above operating conditions, nitrilotriacetic acid and edetic acid are eluted in
99 this order with the resolution between these peaks being not less than 7.

100 System repeatability: When the test is repeated 6 times with 20 μ L of the standard

101 solution under the above operating conditions, the relative standard deviation of the
102 peak area of nitrilotriacetic acid is not more than 1.0 %.

103

104 **Water** 5.0–13.0 % (0.2 g, Karl Fischer method, Direct titration)

105

106 **Assay** Weigh accurately about 0.5 g and dissolve in water to make exactly 200 mL.
107 Pipet 20 mL of this solution, add 80 mL of water, adjust with dilute nitric acid to a pH of
108 2 to 3 and titrate with 0.01 M bismuth nitrate Standard Solution for Volumetric
109 Analysis until the color of the solution changes from yellow to red (indicator: 2 drops of
110 xylenol orange TS).

111

112 Each mL of 0.01 M bismuth nitrate Standard Solution for Volumetric Analysis

113 = 3.743 mg of $C_{10}H_{12}CaN_2Na_2O_8$.

114

115

116

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Reagent

118

119 **Potassium pyroantimonate TS**

120 Dissolve 2 g of potassium pyroantimonate in 95 mL of hot water. Cool quickly and add
121 a solution containing 2.5 g of potassium hydroxide in 50 mL of water and 1 mL of 85 g/L
122 solution of sodium hydroxide. Allow to stand for 24 h, filter and dilute to 150 mL with
123 water.

124

125 **Nitrilotriacetic acid**

126 Nitrilotriacetic acid $C_6H_9NO_6$

127 A white crystalline powder. Melting point: about 240°C (with decomposition).

128 Identification—Determine the infrared absorption spectrum of nitrilotriacetic acid as
129 directed in the paste method under Infrared Spectrophotometry: it exhibits absorption
130 at the wave numbers of about 1718 cm^{-1} , 1243 cm^{-1} , 1205 cm^{-1} , 968 cm^{-1} , 903 cm^{-1} , 746
131 cm^{-1} and 484 cm^{-1} .

132 Loss on drying: not more than 0.5 % (1 g, 105°C, 3 hours).

133 Content: not less than 97.0 %.

134 Assay—Weigh accurately about 0.2 g of nitrilotriacetic acid, dissolve in 50 mL of
135 water by heating, and titrate after cooling with 0.1 M sodium hydroxide Standard
136 Solution for Volumetric Analysis (potentiometric titration). Perform a blank
137 determination in the same manner, and make any necessary correction.

138

139 Each mL of 0.1 M sodium hydroxide Standard Solution for Volumetric Analysis

140 = 9.557 mg of $C_6H_9NO_6$