Titration Application Note T-79

Determination of calcium in cement by photometric titration of the solubilized product according to EN 196-2



This Application Note covers the photometric determination of calcium in cement using the Optrode (610 nm). After digestion of the cement sample, calcium is titrated with EDTA to the murexide endpoint.



Method description

Sample

Cement

Sample preparation

Digestion was carried out according to DIN EN 196-2.

Configuration

907 Titrando	1 x 2.907.0010
800 Dosino	4 x 2.800.0010
Dosing unit 5 mL	1 x 6.3032.150
Dosing unit 10 mL	2 x 6.3032.210
Dosing unit 50 mL	1 x 6.3032.250
802 Rod Stirrer	1 x 2.802.0020
815 Robotic USB SP	1 x 2.815.0110
Sample beaker 250 mL	1 x 6.1432.320
Sample rack 28 x 250 mL	1 x 6.2041.820
Optrode (at 610 nm)	1 x 6.1115.000
Ecotrode plus	1 x 6.0262.100
Electrode cable	1 x 6.2104.030

Solutions

c(Na ₂ EDTA) = 0.03 mol/L, CAS 6381-92-6	11.17 g Na ₂ EDTA • 2H ₂ O is dissolved in dist. H ₂ O, treated with 10 mL c(NaOH) = 1 mol/L and made up to 1 liter with dist. H ₂ O.
Sodium hydroxide solution (saturated)	CAS 1310-73-2
Indicator solution CAS 3051-09-0	0.1 g murexide ground with 10 g sodium chloride and dissolved in 100 mL water.
Triethanolamine CAS 102-71-6	Diluted with dist. water (1 + 4)

Analysis

10 mL of the digested solution are diluted to 50 mL with triethanolamine and 100 mL distilled water and the pH adjusted to 12.5 (\pm 0.5) with NaOH solution.

After addition of 0.1 g murexide indicator (1 mL of the solution), the solution is titrated with EDTA at λ = 610 nm. The color changes from pink to violet.

Parameters

Titration mode	MET
Measurement drift	50 mV/min
Min. waiting time	0 s
Max. waiting time	26 s
Volume increment	0.025 mL
EP criterion	30 mV
EP recognition	last

Calculations

% CaO = (EP1 \times C01 \times C02 \times C03 \times 100 \times 500)/(C00 \times 1000 \times C04)

- EP1 = titrant consumption until the first equivalence point in mL
- C00 = sample weight in g (per 500 mL digestion)
- C01 = concentration of the EDTA titrant in mol/L
- C02 = titer Na₂EDTA (dimensionless unit)
- C03 = molecular weight of CaO in g/mol (56.0774)
- C04 = volume of digested sample

Results

CaO in %
48.81 ± 0.209 (n = 6)
Ca in %
34.89 ± 0.151 (n = 6)

