

THE DETERMINATION OF CALCIUM IN BEER

The concentration of calcium is determined directly by using the technique of Known addition.

Equipment Required:

1. Ion analyser or pH meter with mV scale (EDT directION DR359TX)
2. EDT directION Calcium Combination ISE Cat no 2041

Reagents:

1. Calcium standard solution 0.1M CaCl₂: Dissolve 11.1g of Calcium Chloride into distilled water in a volumetric flask and dilute to 1000 mls.
2. Sodium hydroxide solution 1.0m NaOH: Dissolve 40g of NaOH into distilled water in a volumetric flask and dilute to 1000 mls.

Sample Preparation:

Take 150 ml of beer sample and pass through filter paper to equilibrate CO₂ content with air. Adjust the pH of the sample to 5.5 - 6.0 pH with 1.0m NaOH if necessary.

Method:

Place the electrode (Calcium ISE) into 100 ml of prepared sample, stirring thoroughly. Record the electrode potential mV₁. Add 1.0 ml of 0.1m CaCl₂ standard to the sample solution, stirring thoroughly and allow the reading to stabilise. Record the new electrode potential, mV₂.

Calculation

If a pH/ion meter with a K add mode is being used the calculation of Ca²⁺ in the sample is performed automatically and displayed in direct concentration units of your choice.

If a pH meter with millivolt scale has been used operate the following calculation:

The E value will be given by mV₂ – mV₁. The slope of the electrode should be between 22-29 mV . This can be checked by running a calibration curve of 3 known CaCl₂ solutions.

$$C_u = C_s \left[\frac{V_s}{V_u + V_s} \right] \left[10^{\frac{\Delta E}{S}} - \frac{V_u}{V_s + V_u} \right]^{-1}$$

where: C_u= concentration of the unknown

C_s= concentration of the standard

V_s = volume of the standard (mls)

V_u = volume of the sample (mls)

ΔE = mV₂ – mV₁

S = electrode slope in mV

Note

If smaller sample volumes are to be analysed this can be achieved by scaling down all volumes in the method or by dilution of the urine specimen.