# THE DETERMINATION OF CALCIUM IN WATER

The concentration of calcium is determined directly by using the technique of standard addition. This method is ideally suited to replace long winded titrimetric methods as only a singlre addition is required. This method eliminates the need for indicators.

## Equipment Required:

1. EDT directION Model DR359TX Ion analyser or pH meter with mV scale
2. EDT directION Combination Calcium ion selective electrode cat no 3041

## Reagents:

1. Calcium standard solution O.1m $CaCl_2$: Dissolve 11.1g of Calcium Chloride into distilled water in a volumetric flask and dilute to 1000 mls.
2. ISAB or Reference electrode filling solution O.1m $KNO_3$: dissolve 10.1g of Potassium Nitrate into distilled water in a volumetric flask and dilute to 1OOOmls.
3. Sodium hydroxide solution 1.0m NaOH: Dissolve 40g of NaOH into distilled water in a volumetric flask and dilute to 1000 mls. **This solution is only required for dirty water samples whose pH is below pH 5.5**

## Sample Preparation:

Take 150 ml of Water sample and adjust the pH of the sample to 5.5 - 6.0 pH with 1.0m NaOH if necessary.

## Method:

Place the combination Calcium ISE into 100 ml of prepared sample, stirring thoroughly. Record the electrode potential $mV_1$. Add 1.0 ml of O.1m $CaCl_2$ standard to the sample solution, stirring thoroughly and allow the reading to stabilise. Record the new electrode potential, $mV_2$.

## Calculation:

Use the equation for standard addition (Below) The E value will be given by $mV_2 - mV_1$. The slope of the electrode should be around+29mV. This can be checked by running a calibration curve of 3 known $CaCl_2$ solutions.

The sample solution concentration is given by this equation.

$$Cu = Cs \left[\frac{Vs}{Vu + Vs}\right]\left[10^{\Delta E/S} - \frac{Vu}{Vs + Vu}\right]^{-1}$$

Cu = unknown solution concentration

Cs = standard concentration

Vs = volume of standard

Vu = volume of unknown

$\Delta$E = change in potential (mV)

S = slope of .electrode (mV)