

THE DETERMINATION OF CHLORIDE IN SOIL

The chloride is leached from the oven dried soil using deionised water and is then titrated with standard AgNO_3 using either the EDT directION Chloride ISE or the silver ISE as the end point detector.

Equipment Required:

1. EDT directION Model DR359TX pH/Ion analyser OR pH meter with millivolt scale
2. EDT directION Chloride Combination ISE Cat no 3261 or Silver ISE Cat no 3211
3. 50 ml graduated beaker
4. Accurate balance
5. Magnetic stirrer

Reagents:

1. Silver nitrate (analar)
2. Potassium nitrate

Standard Preparation

Dissolve 1.6987g AgNO_3 with deionised water in a litre volumetric flask, dilute to the mark with deionised water. This is 0.01 Molar AgNO_3 to be used as the titrant.

Sample Preparation

Accurately weigh 4.00g of air dried and ground soil into a 100ml plastic screw cap bottle. Add 50ml of deionised water and shake for 1 hour.

Filter the solution into a 250ml beaker ensuring to wash the residue with deionised water and adding these washings to the filtrate.

Method:

1. Fill the clean burette with standard AgNO_3 solution. If the solution appears cloudy in the burette, discard and wash the burette thoroughly with deionised water. Rinse the burette with a small volume of standard and then refill.
2. Note the burette reading before any additions are made.
3. Place the sample solution on a magnetic stirrer and stir the solution constantly throughout analysis.
4. Immerse the electrode in the sample solution and record the stable potential.
5. Add small amounts of AgNO_3 to the sample and note the stable potential after each addition.
6. Reduce the volume of the additions when the end point approaches, this can be detected by a gradual increase in potential when a silver electrode is used.
7. The end point is where the largest increase in potential occurs per unit volume of titrant.
8. Plot mV reading vs volume of titrant to attain the end point in ml of AgNO_3 .

Calculations:

Concentration of Cl^- in the sample solution =

$$\frac{\text{End point volume} \times \text{concentration of } \text{AgNO}_3}{1000} = x$$

Grams of Chloride present in the sample = $\frac{X \times 35.45 \times \text{volume of titrant}}{1000} = Y$

To express the result in mg Chloride/100g soil

$$= Y \times \frac{100}{\text{mass of soil sample taken}}$$

Note: Chloride content varies greatly with soil type, therefore for certain types the concentration of titrant or the mass of soil taken has to be varied.