



## Method Summary

### Determination of Dissolved Oxygen using the Winkler Titration

#### Scope and Range

This analysis determines the level of dissolved oxygen present in aqueous samples using the Winkler titration method. The method is applicable to most natural waters, ground/surface waters, treated waters, landfill leachates and industrial effluents. This method is only suitable for pre preserved samples. Samples must be analysed within 4 days of receipt. The method determines the dissolved oxygen content of the sample under the conditions of the test. The usual concentration range is up to approximately 9.1mg/l oxygen at 20°C which represents 100% saturation at the stated temperature.

#### Principle

##### Preparation and Extraction

The samples should be preserved on site by adding approximately 2 ml of 50% manganese sulphate tetrahydrate solution and approximately 2 ml of Alsterberg reagent to a 250 ml bottle full of sample. The sample should be stoppered, ensuring no headspace is left in the bottle, and mixed well.

##### Analysis

##### Manual Analysis

2ml of manganese sulphate solution, followed by 2ml of alkaline iodide-azide reagent is added to the sample, making both additions below the surface of the liquid. The stopper is replaced carefully to avoid including air bubbles, and the sample is mixed well. The precipitate is allowed to settle to the lower third of the bottles, the mixing is repeated and the precipitate is allowed to settle completely. 4ml of 50% sulphuric acid is added to the samples, the stopper is replaced and the sample is mixed again. The precipitate will then dissolve. 200ml of the sample is transferred into a conical flask. The sample is then titrated with standardised 0.0125 M sodium thiosulphate solution to a pale straw colour initially, then a few drops of iodine indicator are added. The titration is continued with the standardised 0.0125 M sodium thiosulphate solution to the first disappearance of the blue/purple colour. The amount of dissolved oxygen is then calculated using the following equation:

$$DO = \frac{M_r \times V_2 \times c \times f \times 1000}{4 \times V_1}$$

where:

- DO = dissolved oxygen in mg/l of O<sub>2</sub>
- M<sub>r</sub> = the molecular weight of O<sub>2</sub>
- V<sub>1</sub> = the volume of the sample aliquot used, in ml
- V<sub>2</sub> = the volume of sodium thiosulphate solution used for the titration in ml
- c = the molarity of the sodium thiosulphate solution in moles
- f = a factor to compensate for the addition of reagents to the original sample

##### Auto-titrator Analysis

4ml of 50% sulphuric acid is added to the samples, the stopper is replaced and the sample is mixed. 100ml of sample is transferred into an auto titrator cup and is positioned on the auto sampler table. The auto titrator will calculate the amount of dissolved oxygen and give a readout of the number.

##### Interferences

None known.