Winkler Titrations

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Overview:

This method covers Horizons Regional Council adopted method for performing Winkler titrations in the field. Named after its inventor Ludwid Wilhelm Winkler this method in the past was the standard method for measuring dissolved oxygen. The “standard method” varies with each organisation or laboratory. The titration has limited use as it works between 5 mg / l and 100% saturated water. Titrations measure concentration not saturation, saturation readings can be derived by calculation.

Collecting the sample for a titration:

The sample should be collected as close a possible to a “punch” (logger recorded value). The sample needs to be collected gently to avoid addition of oxygen be the sampling process. Use a large mouthed jug and gently scoop the water. Slowly fill a glass BOD bottle to just below the neck from the jug. Do not just pour the water in as extra oxygen will be absorbed by the water. Allow room for the stopper and approximately 6 ml of air gap. At the time of sample collection, take note of the barometric pressure and water temperature.

Preparing the sample for transport / testing:

At the time of sampling the oxygen needs to be “fixed”.

- Add 2 ml of Manganese Sulphate
- Add 2 ml of Potassium Hydroxide
    - Put the stopper in the BOD bottle and gently invert the sample six times to mix the reagent.
    - A pinkish brown precipitate should form.
    - Allow the sample to stand for several minutes until the precipitate settles below halfway in the BOD bottle. (will be an obvious clear layer)
    - Invert the sample gently for a further 6 times.

-This oxidises the dissolved oxygen to the manganese, effectively locking the oxygen in the sample.

- Add 2 ml of Hydrochloric acid.
    - Put the stopper in the BOD bottle and gently invert the sample six times to mix the reagent.
    - Sample will golden brown colour

-This acidities the solution and will cause the precipitate to dissolve back into the solution. Carrying this step out in the field should help reduce extra oxygen being absorbed by the sample during transportation.

The rest of the titration process should be carried out as soon as possible after sampling up to a maximum of eight hours


- Add 2 ml of starch indicator
    - Gently invert the sample six times.
    - Sample should turn from a golden brown to a dark blue
    - Gently poor 201 ml into a clean flask
- Titrate with Sodium Thiosulphate until the solution turns clear.

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- Every 1 ml of Sodium Thiosulphate used equals 1 mg / litre of dissolved oxygen.