

Standard Operating Procedure (SOP) 3.3.1.2

MEASURING AMMONIA WITH SALICYLATE KITS

By Erick Burres

Nitrogen is a nutrient that occurs naturally in both fresh and salt water. It is essential for plant growth in an aquatic ecosystem. Problems occur when large amounts nitrogen are introduced into the stream ecosystem. As a result, there can be excessive algal growth depleting the available oxygen in the stream that fish and other aquatic organisms depend upon.

Nitrogen exists in numerous forms but most commonly is found in water as nitrate (NO_3^-), nitrite (NO_2^-) and or ammonia (NH_3). Of these forms, nitrate is usually the most stable and is the form most often found in aquatic environments. Nitrite can be found in suboxic waters. Nitrogen is an essential nutrient for growth of algae and other aquatic plants, and nitrates can be present at high levels due to inputs from a variety of sources. Nitrate is very difficult to measure directly, so it is reduced to nitrite and the resulting nitrite concentration is measured. The measurement gives the combined concentration of nitrite (if present) and nitrate concentrations. Because we are interested in the nitrate measurement, background levels of nitrite also have to be measured. Ammonia is toxic in high concentrations, and is preferentially utilized (taken up) by phytoplankton and green plants. Nitrate measurements are reported as nitrate nitrogen (mg/L). Nitrite measurements are reported as nitrite nitrogen (mg/L). Ammonium measurements are reported as ammonium nitrogen (mg/l).

Measuring ammonia levels in water.

Materials and Tools

- 1) 50 mL beaker or flask
- 2) Ammonia Test Kit (if you have salt or brackish water, be sure to use an appropriate test kit)
- 3) 100 mL graduated cylinder
- 4) 500 mL graduated cylinder
- 5) 3 500-mL bottles or jars
- 6) Distilled water

Preparation

Read all instructions carefully in the test kit before beginning. Make sure kit includes all the materials listed. Review proper levels of ammonia that are acceptable in water.

Calibration and Quality Control

Standards should be run at least every six months to verify your technique and the integrity of your chemicals. Fresh standard should be prepared each time unless the standard has been stabilized. Measuring the standards will help to clarify the instructions in test kits where wording may be unclear.

Measuring Nitrogen as Ammonia in Water

Ammonia-Nitrogen Test Kit - Salicylate Method (LaMotte)

- 1) Fill a test tube (0124) to the 5ml mark with sample water.
- 2) Add 10 drops of Salicylate Ammonia #1 (3978).
- 3) Cap the test tube and mix.
- 4) Add 7 drops of Salicylate Ammonia #2 (3982).
- 5) Cap the test tube and mix.
- 6) Wait 20 minutes.
- 7) Insert Ammonia Nitrogen Octa-Slide Bar into the Octa-Slide Viewer (Color Comparitor).
- 8) Insert the tube into the Octa-Slide Viewer.
- 9) Match sample color to a color standard. Record as ppm Ammonia Nitrogen.

Colorimeters:

The accuracy and precision of the nitrate, nitrite, and ammonia tests can be improved by using a colorimeter in place of the color comparator. The colorimeter is a simplified spectrophotometer, which measures the amount of color in the sample at a specific wavelength of light. By choosing the appropriate nutrient test preprogrammed in the colorimeter, the correct wavelength is utilized.

Although the chemistry is the same as for the color comparator kits, the reagents used may be slightly different. Thus, be sure to only use those chemicals specified for the colorimeter method.

The advantage of this method (using a colorimeter) is that it places the accuracy on an electronic measurement. Thus it removes individual subjective differences in readings and removes the problem of trying to decide which color value (from the comparator) your sample is most similar to.

References: LaMotte Instructions: Nitrate Nitrogen Tablet Kit,
G.L.O.B.E. Teachers Manual 1997