

TOP:005.2

January 30, 2014

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and

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TECHNICAL OPERATING PROCEDURE

PROCEDURE TITLE:

Procedures for Measurement of Total Alkalinity in Stream Water

APPLICABILITY:

Procedures apply to all measurements of total alkalinity conducted during stream treatments or toxicity tests

PRINCIPLE:

Standard procedures for measurement of total alkalinity in water

SAMPLE COLLECTION AND PRESERVATION:

Samples of stream water are collected and transported in plastic bottles. Measurements of total alkalinity are conducted on the day of sampling.

EQUIPMENT REQUIRED:

pH meter
Jencons [Scientific] Limited digital titrator
Glass buret
Magnetic stirrer

POTENTIAL INTERFERENCES:

Any substances which may interfere with the operation of the pH meter

SAFETY:

Standard laboratory safety procedures are followed when handling buffers and sulfuric acid solution. No specialized safety procedures are required.

DISPOSAL:

There are no special requirements for the disposal of buffers or water samples. N/50 sulfuric acid solution is diluted with water during disposal.

REAGENTS:

pH buffers (4.0, 7.0, and 10.0) for calibration of pH meter (check expiration dates)
Standardized sulfuric acid solution (N/50) (check expiration date)

PROCEDURES:

Definition: Total alkalinity is the quantitative capacity of a water sample to neutralize a strong acid to a designated pH.

- I. Measurement of total alkalinity
 - A. Standardize a pH meter according to the instrument operating procedure (IOP:007.xA, IOP:007.xB, and IOP:008.x).
 - B. Measure 50.0 mL of unfiltered stream water in a graduated cylinder (Optional: use 100.0 mL sample with corresponding change in calculation). Pour the sample into a small beaker.
 - C. Place a stir bar into the sample and set the beaker on a magnetic stirrer operating on a low speed setting.
 - D. Place the probes of the pH meter into the water sample.
 - E. Press the AUTO button on the Beckman pH meter (auto function off) to allow a continuous readout.
 - F. Prepare the digital titrator according to the instrument operating procedures (IOP:009.x), and zero the display or fill the glass buret.
 - G. Titrate with N/50 (0.02N) sulfuric acid solution while watching the resulting changes in pH. Continue the titration until the pH reaches the endpoint of pH 4.5.
 - H. Calculate the total alkalinity:
 1. Read the number of mLs of sulfuric acid solution dispensed during the titration.
 2. Multiply the number of mLs of sulfuric acid solution by 20 to determine the total alkalinity of the water sample expressed as CaCO_3 .
 3. A sample volume of 100 mLs may be used for the measurement. If the total alkalinity of a 100 mL sample is measured the multiplication factor used in the calculation is 10.


II. Documentation

- A. Document the standardization of the pH meter by making appropriate entries into the instrument log book.
- B. The total alkalinity of water samples is recorded on the Water Chemistry data form (Appendix M).

REFERENCES:

Instrument Operating Manuals: Beckman pHI 240 and pHI 255 meter
Accumet AR15, XL15/150 pH meters
Jencons Digitrate digital titrator
BrandTech 25 ml digital titrator

This procedure has been reviewed and approved by the undersigned representatives of the U.S. Fish and Wildlife Service and Fisheries and Oceans Canada.

REVIEWED/APPROVED  DATE 2-12-14
Field Supervisor (U.S.)

REVIEWED/APPROVED  DATE 2-12-14
Division Manager (Canada)