
MAJOR IONS AND TRACE ELEMENTS 5.6.2

Bottles (including acid-rinsed polyethylene and glass bottles) used to collect samples for analysis of major ions and trace elements should be rinsed and partially filled with DIW before they are used at the field site, as instructed in NFM 3. Exceptions apply when collecting samples for analysis of isotopes or radiochemicals—consult the isotope laboratory. Collect and process samples within processing and preservation chambers, as appropriate, and while wearing appropriate (for example, vinyl) disposable, powderless gloves. In general, change gloves between each collection and processing step. After collection and processing, check the bottle label for correct information and place glass bottles into foam sleeves.

- ▶ Use acid-rinsed bottles (for cations) only if they arrive capped with colorless translucent caps. Do not use any acid-rinsed bottles that are received uncapped.
- ▶ Before going to the field, first rinse and then half fill each bottle with DIW as described in NFM 3.
- ▶ Discard DIW from bottles at the field site before field rinsing and (or) sampling.

- ▶ **Field rinse the inside of sample bottles and bottle caps with sample** (table 5-2; Appendix A5-B). Use filtrate to rinse the bottles that will contain filtered sample.

5.6.2.A Major and Minor Cations and Trace Elements

Use of Clean Hands/Dirty Hands techniques and good field practices are required for samples with parts-per-billion concentrations of trace elements and are recommended for all samples.

Raw samples:

1. Label acid-rinsed polyethylene bottles as "RA" for major and minor cations and most trace-element samples. Label bottles with the laboratory schedule, as appropriate.
 - Arsenic, antimony, and selenium analyses—Label bottles as "RAH." (Some samples are designated "USEPA"—check with the laboratory.)
 - Mercury samples—Label glass bottles as "RAM."
 - USEPA drinking water samples—Label bottles as described in NWQL Technical Memorandum 97.05 or as directed.
2. Field rinse and fill sample bottles directly from the sample-collection or processing device.
3. Add chemical treatment, as specified by the analyzing laboratory.
 - Major and minor cations and trace elements: Add HNO_3 to lower sample pH to <2 .
 - Mercury: Add contents of ampoule containing 10 mL of $\text{HNO}_3/\text{K}_2\text{Cr}_2\text{O}_7$.

Filtered samples:

1. Label acid-rinsed polyethylene bottles as "FA" for most trace-element samples, including arsenic, antimony, and selenium. Check NWQL Technical Memorandum 97.05 for requirements for USEPA drinking water samples.
Exception: Mercury—Label the acid-rinsed 250-mL glass bottles as "FAM."

2. Field rinse and fill sample bottles directly from the filter assembly. Refer to section 5.2 for filtration instructions.
3. Add chemical treatment, if specified by the analyzing laboratory.
 - Major and minor cations and trace elements: Add HNO_3 to lower sample pH to <2.
 - Mercury: Add contents of ampoule containing 10 mL of $\text{HNO}_3/\text{K}_2\text{Cr}_2\text{O}_7$.

Nutrients (Nitrogen and Phosphorus) 5.6.2.B

Refer to Office of Water Quality Technical Memorandums 94.16 and 99.04 and check for the most recent changes to collecting and processing nutrient samples.

Raw samples:

1. Label bottles as follows:
 - "WCA" for raw samples to be treated with H_2SO_4 (125-mL translucent bottles are preferable).
 - "ERC" for raw samples collected for the USEPA Drinking Water Program (refer to National Water Quality Laboratory Technical Memorandum 97.05 or contact the laboratory for instructions).
2. Field rinse and fill the sample bottles directly from the sampler or sample splitting device.
3. Add chemical treatment to WCA and ERC samples, as appropriate.
4. Chill WCA and ERC samples immediately and maintain at 4°C or below without freezing.

Filtered samples:

1. Label bottles as follows:
 - "FCC" for filtered samples (125-mL brown bottles).
 - "FCA" for filtered samples to be treated with H_2SO_4 (125-mL brown bottles).
2. Field rinse and fill sample bottles directly from the capsule filter or other filter assembly.

- **Use of 0.45- μm pore-size filter media is the standard to date for State or Federal programs that regulate drinking water and for routine water-quality studies for which consistency with historical nutrient data is necessary.**
 - Use of 0.2- μm pore-size filter media is recommended for studies for which exclusion of bacteria from the sample is desirable, and inconsistency with historical data is not an issue. Prefilter sediment-laden samples through 0.45- μm filter media. Record the filter pore size used, if other than 0.45 μm , under the comments section on the field form and ASR forms.
3. Add chemical treatment to FCA samples. (FCC samples do not require chemical treatment.)
 4. Chill FCC and FCA samples immediately and maintain at 4°C or below without freezing.

5.6.2.C Anions

Label polyethylene bottles as "FU" (filtered untreated). Process alkalinity samples for field titration using the same steps as for other anions (with the exception of ANC samples) (NFM 6).

1. Refer to section 5.2 for filtration instructions.
2. Field rinse and fill sample bottles directly from the capsule filter (or filter assembly).
3. Do not add chemical treatment.

Exceptions:

- **Cyanide**—Label the 250-mL polyethylene bottle as "LC0880" for filtered sample and as "LC0023" for raw sample. **Cyanide requires addition of NaOH to raise the pH to >12.**
- **ANC** (acid neutralizing capacity)—Do not filter the ANC sample. Label sample bottle as "RU" (NFM 6).