

Table 2. General Guidelines for selecting equipment on the basis of construction material and target analyte(s)

[✓, generally appropriate for use shown; Si, silica; Cr, chromium; Ni, nickel; Fe, iron; Mn, manganese; Mo, molybdenum; CFC, chlorofluorocarbon; B, boron]

Construction material for sampling equipment		Target analyte(s)	
Material	Description	Inorganic	Organic
Plastics¹			
Fluorocarbon polymers ² (other varies available for differing applications)	Chemically inert for most analytes	✓ (potential source of fluoride)	✓ (Sorption of some organics)
Polypropylene	Relatively inert for inorganic analytes	✓ (not appropriate for Hg)	Do not use
Polypropylene (linear)	Relatively inert for inorganic analytes	✓ (not appropriate for Hg)	Do not use
Polyvinyl chloride (PVC)	Relatively inert for inorganic analytes	✓ (not appropriate for Hg)	Do not use
Silicone	Very porous. Relatively inert for most inorganic analytes	✓ (potential source of Si)	Do not use
Metals			
Stainless steel 316 (SS 316)	SS-316-metal having the greatest corrosion resistance. Comes in various grades. Used for submersible pump casing.	✓ (Potential source of Cr, Ni, Fe, and possible Mn and Mo) Do not use for surface water unless encasted in plastic.	✓ Do not use if corroded ³
Stainless steel 304	Similar to SS-316, but less corrosion resistant	Do not use	✓ Do not use if corroded ³
Other metals: brass, iron, copper, aluminum, galvanized and carbon steels	Refrigeration-grade copper or aluminum tubing are used routinely for collection of CFC samples	Do not use	✓ Routinely used for CFCs Do not use if corroded ³
Glass			
Glass, borosilicate (laboratory grade)	Relatively inert. Potential sorption of analytes	✓ Do not use for trace element analyses. Potential source of B and Si	✓

¹Plastic used in connection with inorganic trace-element sampling should be uncolored or white. Tubing used for trace metal sampling should be cleaned by soaking in 5-10 percent HCl solution for 8-24 hours, rinsing with reagent water (metals free) and allowed to air dry in mercury-free environment. After drying, the tubing is doubled-bagged in clear polyethylene bags, serialized with a unique number, and stored until used.

² Fluorocarbon polymers include materials such as Teflon™, Kynar™, and Tefzel™ that are relatively inert for sampling inorganic or organic analytes. Only fluoropolymer should be used for samples that will analyzed for mercury because mercury vapors can diffuse in or out of other materials, resulting in either contaminated or biased results.

³ Corroded/weathered surfaces are active sorption sites for organic compounds.

Table 3. Summary of grab sample collection methods, preservation, storage and handling requirements

PARAMETERS	CONTAINERS	SAMPLE VOLUME (mL)	PRESERVATION	MAXIMUM HOLDING TIME
WATER				
ROUTINE WATER SAMPLE				
Alkalinity	Cubitainer or Glass	100	Cool to 4 °C, dark	14 days
Total Suspended Solids/Suspended Solids	Cubitainer or Glass	400	Cool to 4 °C, dark	7 days
Chloride (Cl)	Cubitainer or Glass	100	None required	28 days
Sulfate (SO₄)	Cubitainer or Glass	100	Cool to 4 °C, dark	28 days
Orthophosphate (OPO₄)	Cubitainer or Glass	150	Filter ASAP; Cool to 4 °C, dark	48 hours
Nitrate + Nitrite (NO₃ + NO₂)	Cubitainer or Glass	150	1-2 mL conc. H ₂ SO ₄ to pH <2, and Cool to 4 °C, dark	28 days
Ammonia (NH₃)	Cubitainer or Glass	150	1-2 mL conc. H ₂ SO ₄ to pH <2, and Cool to 4 °C, dark	28 days
Total Phosphorus (TPO₄)	Cubitainer or Glass	150	1-2 mL conc. H ₂ SO ₄ to pH <2, and Cool to 4 °C, dark	28 days
Total Organic Carbon (TOC)	Cubitainer or Glass	100	1-2 mL conc. H ₂ SO ₄ to pH <2, and Cool to 4 °C, dark	28 days
Chlorophyll a	Quart cubitainer	1,000	Cool to 4 °C, dark	Filter 48 hours Filters may be stored frozen up to 30 days
Nitrite	Quart cubitainer	50	Cool to 4 °C, dark	48 hours
Total Dissolved Solids	Quart cubitainer	250	Cool to 4 °C, dark	7 days
Hardness	Quart cubitainer	250	2 mL conc. HNO ₃ to pH<2; Cool to 4 °C, dark OR 2 mL conc. H ₂ SO ₄ to pH <2; Cool to 4 °C, dark	6 months
ROUTINE WATER SAMPLE COLLECTION PROCEDURE				
<ul style="list-style-type: none"> ◦Label container before collection with a unique sample identifier number, Station Location, Date and Sample Type ◦Place an X on the container lid to identify the acidified sample. ◦Open containers by pulling apart. Pre-rinsing cubitainers with ambient water is not necessary. ◦Fill each container with ambient water by submerging container approximately one foot below the surface mid-stream until filled. ◦Place sample on ice immediately. Acidify the X container as soon as possible. ◦Place on ice and ship as soon as possible. 				

Table 3. Summary of grab sample collection methods, preservation, storage and handling requirements–Continued

PARAMETERS	CONTAINERS	SAMPLE VOLUME (mL)	PRESERVATION	MAXIMUM HOLDING TIME
WATER				
NON-ROUTINE WATER SAMPLES				
OIL AND GREASE	Glass container with teflon lined lid rinsed with hexane or methylene chloride	1,000	2 mL conc. H ₂ SO ₄ to pH <2; cool to 4 °C, dark	28 days
PHENOLS	Glass container with teflon lined lid	1,000	2 mL conc. H ₂ SO ₄ to pH <2; cool to 4 °C, dark	28 days
BIOCHEMICAL OXYGEN DEMAND	Gallon cubitainer	> 4,000	Cool to 4 °C; add 1g FAS crystals per liter if residual chlorine present	48 hours
CHEMICAL OXYGEN DEMAND	Quart cubitainer	110	2 mL conc. H ₂ SO ₄ to pH <2; cool to 4 °C, dark	28 days
METALS-IN-WATER				
DISSOLVED (except Hg)	HNO ₃ cleaned quart plastic container	1,000	Filter at sample site with 0.45 micron in-line filter ¹ into ultra-pure ² HNO ₃ preacidified container to pH<2	6 months
DISSOLVED MERCURY	HNO ₃ cleaned quart plastic container	1,000	Filter at sample site with 0.45 micron in-line filter ¹ into ultra-pure ² HNO ₃ preacidified container to pH<2	28 days
TOTAL (except Hg)	HNO ₃ cleaned quart plastic container	1,000	Preacidified container with 5 mL ultra-pure ² HNO ₃ to pH<2	6 months
TOTAL MERCURY (Hg)	HNO ₃ cleaned quart plastic container	600	Preacidified container with 5 mL ultra-pure ² HNO ₃ to pH<2	28 days
HEXAVALENT CHROMIUM (filtered)	Plastic or glass	600	Cool to 4 °C, dark	24 hours; must notify lab in advance
METALS-IN-WATER SAMPLE COLLECTION PROCEDURES				
DISSOLVED METALS (includes Hexavalent Chromium)				
<ul style="list-style-type: none"> ◦Put on powder-free latex, polyethylene, or vinyl gloves using Clean Hands/Dirty Hands technique. ◦Assemble pump³, tubing, and filter. ◦Immerse intake tubing directly into water 1ft. and pump approx. 500 mL of ambient water to flush tubing and filter. ◦Fill precleaned, preacidified container with 600-1,000 mL of filtrate leaving some head space. 				
TOTAL METALS				
<ul style="list-style-type: none"> ◦Put on powder-free latex, polyethylene, or vinyl gloves using Clean Hands/Dirty Hands technique. ◦Assemble pump, and tubing without filter. ◦Immerse intake tubing directly into water 1ft. and pump approx. 500 mL of ambient water to flush tubing ◦Fill precleaned, preacidified container with 600-1,000 mL of filtrate leaving some head space. 				
NOTES				
¹ Capsule Filter: 15 mm diameter or larger, tortuous path capsule filters, Gelman Supor™ 12175, or equivalent (Ref. EPA Method 1669).				
² Nitric Acid, Ultra-pure, commercially known as Ultrex™, Ultrapure Reagent.				
³ Pump and pump apparatus—Required for use with the container method. Peristaltic pump—115 a.c., 12 volt d.c., internal battery, variable speed, single head, Cole-Parmer, portable, Masterflex L/S™, Catalog No. H-07570-10 drive with Quick Load pump head, Cat. No. H-07021-24, or equivalent (Ref. EPA Method 1669).				

Table 3. Summary of grab sample collection methods, preservation, storage and handling requirements—Continued

PARAMETERS	CONTAINERS	SAMPLE VOLUME (mL)	PRESERVATION	MAXIMUM HOLDING TIME
ORGANICS/PESTICIDES-IN-WATER				
VOLATILE ORGANICS (VOA)	Two 40-mL VOA vials	80	Cool to 4 °C, dark; or 2-4 drops ¹ HCl to pH<2, cool to 4 °C, dark for BTEX	14 days
ORGANICS		1,000	Cool to 4 °C, dark	7 days until extraction and 40 days after extraction
PESTICIDES & HERBICIDES Organophosphorus Pesticides Organochlorine Pesticides Chlorinated Herbicides	1-qt. glass container with teflon lined lid per sample type; <i>must be prerinsed with hexane, acetone, or methylene chloride</i>	Each sample type requires 1,000 mL in a separate container	If chlorine is present, add 0.1 g sodium thiosulfate	
SEMI-VOLATILE ORGANICS				
ORGANICS-IN-WATER COLLECTION PROCEDURES				
<p>Label each container before collection with tag no./unique sample identifier number, Station Location, Date, and "ORGANICS: Organophosphorus Pesticides, Organochlorine Pesticides, or Chlorinated Herbicides" or "SEMI-VOLATILE" (depending on the sample type).</p> <ul style="list-style-type: none"> ◦ Fill to the top. Put in dark and on ice. ◦ Fill quart container(s) to the top. Put in dark and on ice. 				
BIOLOGICAL				
TOXICITY IN WATER	Two 1-gallon cubitainers	8,000 mL	Cool to 4 °C, dark	36 hours
TOXICITY SAMPLE COLLECTION PROCEDURES				
<p>WATER</p> <ul style="list-style-type: none"> ◦ Label containers before collection with Station Location, Date, and Sample Type. ◦ Open cubitainer by pulling apart. Pre-rinsing cubitainers with ambient water is not necessary. ◦ Fill each container with ambient water by submerging container approx. 1-ft. below the surface mid-stream until filled. ◦ Place on ice and ship as soon as possible. <p>NOTES</p> <p>¹Prior to preserving with HCl, discuss with laboratory personnel; preserved samples may cause damage to analytical equipment. If sample is analyzed within 48 hours, preservation may not be required.</p>				