Marine and Freshwater Research Laboratory Environmental Science
Murdoch University

Murdoch University
90 South Street, Murdoch, Western Australia 6150
Telephone: (08) 9360 6907 Web: www.murdoch.edu.au/mafrl

Table 1.1 Water sample Bottle Requirements, Preservation and Holding Times

Determinand	Reporting Limit	Container	Filling Technique	Preservation and Holding Time
Ammonia (NH_4-N)	3 µg.N.L^{-1}	Field filtered 2 x 10mL PP tube Label ANP and FSP	Syringe filter on site with 0.45 µm cellulose acetate membrane syringe filter. Rinse the filter by filtering ~20 mL of sample through it, then rinse tube with filtered sample and fill to 10 mL line (not over).	Store Cold 24 hours or Freeze 1 month (AS5667.1-1998)
Nitrate+Nitrite (NO_x-N)	2 µg.N.L^{-1}			
Phosphate (PO_4-P)	2 µg.P.L^{-1}			
Ammonia (NH_4-N)	3 µg.N.L^{-1}	Unfiltered 1 x 125 mL HDPE bottle Label ANP-UF	Unfiltered. Rinse bottle with sample and fill below the neck (~80% full).	Store Cold 6 hours (AS5667.1-1998)
Nitrate+Nitrite (NO_x-N)	2 µg.N.L^{-1}			Store Cold 24 hours (AS5667.1-1998)
Phosphate (PO_4-P)	2 µg.P.L^{-1}			Must be filtered on site (AS5667.1-1998)
Nitrite (NO_2-N)	2 µg.N.L^{-1}	Unfiltered 1 x 125 mL HDPE bottle Label NO2-UF	Unfiltered. Rinse bottle with sample and fill below the neck (~80% full).	Store Cold 48 hours (APHA Table 1060:I)
Nitrite (NO_2-N)	2 µg.N.L^{-1}	Field filtered 1 x 10mL PP tube Label NO2-F	Syringe filter on site with 0.45 µm cellulose acetate membrane syringe filter. Rinse the filter by filtering ~20 mL of sample through it, then rinse tube with filtered sample and fill to 10 mL line (not over).	Store Cold 48 hours (APHA Table 1060:I) or Freeze 48 hours (AS5667.1-1998)
Total Nitrogen (TN)	50 µg.N.L^{-1}	2 x 125mL HDPE bottles Label: TNTP and SPARE	Unfiltered. Rinse bottle with sample and fill below the neck (~80% full).	Store Cold 24 hours or Freeze 1 month (AS5667.1-1998)
Total Phosphorus (TP)	5 µg.P.L^{-1}			
Total Dissolved Nitrogen (TDN)	50 µg.N.L^{-1}	2 x 125mL HDPE bottles Label: TDNP-F and SPARE-F	Syringe filter on site with 0.45 µm cellulose acetate membrane syringe filter. Rinse the filter by filtering ~20 mL of sample through it, then rinse bottle with sample and fill below the neck (~80% full).	Store Cold 24 hours or Freeze 1 month (AS5667.1-1998)
Total Dissolved Phosphorus (TDP)	5 µg.P.L^{-1}			
Chlorophyll abc (trichromatic)	0.1 µg.L^{-1}	Plastic HDPE bottle (1-5L). Label Chl-abc-UF	Unfiltered. Rinse bottle with sample and fill.	Store Cold in dark 24 hours (AS5667.1-1998) up to 48 hours (APHA Table 1060:I)
		Envelope Label Chl-abc-F	Filter sample through a 47 mm GF/C, fold sample GF/C in quarters, wrap in an unused GF/C, then place in a labelled envelope with volume filtered recorded.	Store Cold 24 hours or Freeze 1 month (AS5667.1-1998)
Chlorophyll a (acid correction)	0.1 µg.L^{-1}	Plastic HDPE bottle (1-5L) Label Chl-a-UF	Unfiltered. Rinse bottle with sample and fill.	Store Cold in dark 24 hours (AS5667.1-1998) up to 48 hours (APHA Table 1060:I)
		Envelope Label Chl-a-F	Filter sample through a 47 mm GF/C, fold sample GF/C in quarters, wrap in an unused GF/C, then place in a labelled envelope with volume filtered recorded.	Store Cold 24 hours or Freeze 1 month (AS5667.1-1998)

Version 1 Authorised by: K Wienczugow Date: 25/06/2020

Murdoch University
90 South Street, Murdoch, Western Australia 6150
Telephone: (08) 9360 6907 Web: www.murdoch.edu.au/mafrl

Table 1.1 cont: Water sample Bottle Requirements, Preservation and Holding Times

Determinand	Reporting Limit	Container	Filling Technique	Preservation and Holding Time
Sulphate (SO_4)	1 mg.L^{-1}	Field filtered 10mL PP tube Label SO_4/Cl-F	Syringe filter on site with 0.45 µm cellulose acetate membrane syringe filter. Rinse tube with filtered sample and fill to 10 mL line.	Store Cold 28 days (APHA Table 1060:I)
Chloride (Cl)	1 mg.L^{-1}			
Sulphate (SO_4)	1 mg.L^{-1}	Unfiltered 1 x 125 mL Label SO_4/Cl-UF	Unfiltered. Rinse bottle with sample and fill below the neck (~80% full).	Store Cold 28 days (APHA Table 1060:I)
Chloride (Cl)	1 mg.Cl.L^{-1}			
Silicate (SiO_3)	2 µg.Si.L^{-1}	10mL PP tube Label SiO_3-F	Syringe filter on site with 0.45 µm cellulose acetate membrane syringe filter. Rinse tube with filtered sample and fill to 10 mL line.	Store Cold 1 month (AS5667.1-1998)
Silicate (SiO_3)	2 µg.Si.L^{-1}	Unfiltered 1 x 125 mL Label SiO_3-UF	Unfiltered. Rinse bottle with sample and fill below the neck (~80% full).	Store Cold 24 hours (AS5667.1-1998)
Total Organic Carbon (TOC)	0.5 mg.C.L^{-1}	125mL HDPE bottle Label TOC-UF	Rinse and fill the bottle below the neck (~80% full)	For dissolved carbon, samples must be field filtered. Store Cold 2 hours (USEPA 9060A) or Freeze 1 month (AS5667.1-1998)
Dissolved Organic Carbon (DOC)	0.5 mg.C.L^{-1}	125mL HDPE bottle Label: DOC-F	Syringe filter on site with 0.45 µm cellulose acetate membrane syringe filter. Rinse the filter by filtering ~20 mL of sample through it, then rinse bottle with filtered sample and fill the bottle below the neck (~80% full)	
Total Organic Carbon (TOC)	0.5 mg.C.L^{-1}	125mL brown glass bottle. Label TOC-UF	Fill bottle containing sulphuric acid preservative with filtered sample to below the neck (~80% full)	For dissolved carbon, samples must be field filtered. Store Cold 2 hours (USEPA 9060A) or Freeze 1 month (AS5667.1-1998)
Dissolved Organic Carbon (DOC)	0.5 mg.C.L^{-1}	125mL brown glass bottle. DOC-F	Syringe filter on site with 0.45 µm cellulose acetate membrane syringe filter. Rinse the filter by filtering ~20 mL of sample through it, then rinse bottle with filtered sample and fill the bottle below the neck (~80% full)	
Dissolved Inorganic Carbon (DIC)	0.5 mg.C.L^{-1}	20mL septa vial Label: DIC-F	Syringe filter on site with 0.45 µm cellulose acetate membrane syringe filter. Rinse the filter by filtering ~20 mL of sample through it, then rinse bottle with filtered sample and fill the vial with zero headspace	Store cold analyse within 14 days as per alkalinity (APHA Table 1060:I).
Sulphide	0.02 mg.S.L^{-1}	1L HDPE bottle Label: Sulphide	Fill bottle containing zinc acetate preservative (do not rinse) add tube of NaOH	1.5mL 4M NaOH and 2mL Zinc Acetate (preservative) Store Cold 7 days (AS5667.1-1998)
Turbidity	0.1 NTU	125mL HDPE bottle Label: Turb	Rinse and fill the bottle to the neck.	None required 24 hours (AS5667.1-1998)
Colour	0.1 gilvin 440m^{-1}	10mL PP tube Label: Colour-F	Syringe filter on site with 0.2 µm cellulose acetate membrane syringe filter. Rinse tube with filtered sample and fill to 10 mL line.	Store Cold 2 days (AS5667.1-1998)
Colour	0.1 gilvin 440m^{-1}	125mL HDPE bottle Label: Colour-UF	Unfiltered. Rinse bottle with sample and fill below the neck (~80% full).	Store Cold 2 days (AS5667.1-1998)

Murdoch University
90 South Street, Murdoch, Western Australia 6150
Telephone: (08) 9360 6907 Web: www.murdoch.edu.au/mafrl

Table 1.1 cont: Water sample Bottle Requirements, Preservation and Holding Times

Determinand	Reporting Limit	Container	Filling Technique	Preservation and Holding Time
pH	±0.1 pH units	-	-	The test should be carried out as soon as possible, preferably in the field. (AS5667.1-1998)
		125mL HDPE bottle Label: pH	Unfiltered. Rinse bottle with sample and fill below the neck (~80% full).	Store Cold 6 hours (AS5667.1-1998)
Conductivity/Salinity		125mL HDPE bottle Label: Ec	Rinse and fill bottle completely to exclude air	None 24 hours or Store cold 1 month (AS5667.1-1998)
Total Suspended Solids (TSS) with Loss on Ignition (TSS/LOI)	1 $mg.L^{-1}$	HDPE bottle (1-5L) Label: TSS-UF	Unfiltered. Rinse bottle with sample and fill.	Store Cold 7 days. (APHA Table 1060:I)
		Envelope Label: TSS-F	Filter sample through a pre-weighed 47 mm GF/C, rinse by filtering with 3 x 50mL DI water (to remove salt crystals), fold sample GF/C in quarters, wrap in an unused GF/C, then place in a labelled envelope with weight and volume filtered recorded on envelope.	Store Frozen 1 month
Total Dissolved Solids (TDS)	0.05 $g.L^{-1}$	125mL HDPE bottle Label: TDS	Rinse and fill bottle completely to exclude air	Store Cold: preferable 24 hours (AS5667.1-1998), but no more than 7 days (APHA Table 1060:I)
Chromium VI	2ug.L^{-1}	125mL HDPE bottle unpreserved Label: Cr VI-F or CrVI-UF	Unfiltered. Rinse bottle with sample and fill to below the neck. Dissolved: Syringe filter on site with 0.45 µm cellulose acetate membrane syringe filter, rinse bottle with filtered sample and fill to below the neck.	Store Cold. Preserve within 24 hours. (AS5667.1-1998) Analyse within 28 days of collection (APHA Table 1060:I)
Chromium VI	2ug.L^{-1}	125mL HDPE bottle with preservative Label: Cr VI-F or CrVI-UF	Unfiltered. Fill bottle containing ammonium sulphate buffer and sodium hydroxide to below neck ~80% do not rinse. Dissolved: Syringe filter on site with 0.45 µm cellulose acetate membrane syringe filter into bottle containing ammonium sulphate buffer and sodium hydroxide to below neck ~80% do not rinse.	Store Cold. Analyse within 28 days of collection (APHA Table 1060:I)
Acidity	2mg.L^{-1}	125mL HDPE bottle Label: Acid	Rinse and fill bottle completely to exclude air	Store Cold. 14 days. (APHA Table 1060:I)
Alkalinity	2mg.L^{-1}	250mL HDPE bottle Label: Alk	Rinse and fill bottle completely to exclude air	Store Cold. 14 days. (APHA Table 1060:I)
Fluoride	0.05mg.L^{-1}	125mL HDPE bottle Label: Fluoride	Rinse and fill the bottle to the neck.	None required. 1 month (AS5667.1-1998)

Murdoch University
90 South Street, Murdoch, Western Australia 6150
Telephone: (08) 9360 6907 Web: www.murdoch.edu.au/mafrl

Table 1.1 cont: Water sample Bottle Requirements, Preservation and Holding Times

Determinand and Reporting Limit μgL^{-1}	Container	Filling Technique	Preservation	Maximum Holding Time
ICP-AES (Dissolved trace elements)				
Ag (<10), Al (<10), As (<20), Ba (<0.4), Be (<0.1), Cd (<0.6), Co (<2), Cr (<1), Cu (<1), Fe (<2), Li (<100), Mn (<0.2), Mo (<4), Ni (<7), Pb (<10), Sb (<20), Se (<20), Sn (<20), Ti (<1), Tl (<20), V (<2), Zn (<2)	1 x 10mL PP tube	Filter in the field with a Polyethylene HDPE plunger through a 0.45µm cellulose acetate disposable filter. Rinse the tube with filtered sample first, and then fill approximately to the line.	3mL 50% Nitric Acid per litre of sample (~1 drop per 10mL tube)	2 weeks before acidification then 6 months (USEPA 200.7)
ICP-AES (Dissolved major elements)				
B (<6), Ca (<5), K (<50), Mg(<5), Na (<50), P (<20), S (<50), Sr (<1)	1 x 10mL PP tube	Filter in the field with a Polyethylene HDPE plunger through a 0.45µm cellulose acetate disposable filter. Rinse the tube with filtered sample first, and then fill approximately to the line.	3mL 50% Nitric Acid per litre of sample (~1 drop per 10mL tube)	2 weeks before acidification then 6 months (USEPA 200.7)
CV-ICP-AES (Dissolved trace elements)				
Hg (<0.1)	100mL glass bottle (wide neck)	Filter in the field with a Polyethylene HDPE plunger through a 0.45µm cellulose acetate disposable filter. Rinse the bottle with filtered sample first, and then fill approximately to the shoulder.	1mL of Dichromate preservative (5% Potassium Dichromate, 15% Nitric Acid)	2 weeks before acidification (USEPA 200.7) then 1 month once preserved (AS5667.1-1998)
ICP-AES (Total extractable elements)				
Ag (<10), Al (<10), As (<20), Ba (<0.4), Be (<0.1), Cd (<0.6), Co (<2), Cr (<1), Cu (<1), Fe (<100), Li (<100), Mn (<0.2), Mo (<4), Ni (<7), Pb (<10), Sb (<20), Se (<20), Sn (<20), Ti (<1), Tl (<20), V (<2), Zn (<5)	1 x 125mL PP jar	Rinse the tube with sample first, then fill approximately to the 50mL line.	3mL 50% Nitric Acid per litre of sample (~5 drops per 50mL tube)	2 weeks before acidification then 6 months (USEPA 200.7)
CV-ICP-AES (Total extractable elements)				
Hg (<0.1)	100mL glass bottle (wide neck)	Rinse the bottle with sample first, then fill approximately to the shoulder	1mL of Dichromate preservative (5% Potassium Dichromate, 15% Nitric Acid)	2 weeks before acidification (USEPA 200.7) then 1 month once preserved (AS5667.1-1998)

Murdoch University
90 South Street, Murdoch, Western Australia 6150
Telephone: (08) 9360 6907 Web: www.murdoch.edu.au/mafrl

Table 1.1 cont: Water sample Bottle Requirements, Preservation and Holding Times

Determinand and Reporting Limit µgL^{-1}	Container	Filling Technique	Preservation	Maximum Holding Time
ICP-MS (Filtered Ultra Trace elements)				
Ag (<0.1), Al (<5), As (<0.5), Ba (<0.5), Be (<1), Bi (<0.1), Cd (<0.1), Co (<0.05), Cr (<0.2), Cu (<0.2), Fe (<1), Ga (<1), La (0.2), Li (<100), Mn (<0.5), Mo (<0.5), Ni (<0.3), Pb (<0.1), Sb (<0.5), Se (<1), Sn (<1), Ti (<1), Tl (<0.1), U (<0.2), V (<0.3), Zn (<1)	2 x 10mL PP tube	Filter in the field with a Polyethylene HDPE plunger through a 0.45µm cellulose acetate disposable filter. Rinse the filter with the sample first, then rinse the tube with sample, then fill approximately to the 10mL line.	3mL 50% Nitric Acid per litre of sample (~1 drop per 10mL tube)	2 weeks before acidification then 6 months (USEPA 200.8)
ICP-MS (Unfiltered Ultra Trace elements)				
Ag (<0.1), Al (<5), As (<0.5), Ba (<0.5), Be (<1), Bi (<0.1), Cd (<0.1), Co (<0.05), Cr (<0.2), Cu (<0.2), Fe (<1), Ga (<1), La (0.2), Li (<100), Mn (<0.5), Mo (<0.5), Ni (<0.3), Pb (<0.1), Sb (<0.5), Se (<1), Sn (<1), Ti (<1), Tl (<0.1), U (<0.2), V (<0.3), Zn (<1)	1 x 125mL PP jar	Rinse the tube with sample three times first, and then fill approximately to the 100mL line.	3mL 50% Nitric Acid per litre of sample (~6 drop per 100mL tube)	2 weeks before acidification then 6 months (USEPA 200.8)

Table 1.2 Solid samples Jar Requirements, Preservation and Holding Times

Determinand	Reporting Limit	Container	Filling Technique	Preservation and Holding Time
Total Kjeldahl Nitrogen	0.1mg.N.g^{-1}	70mL PP jar	Fill with sediment (_80%)	Store Cold 7 days (MAFRL) Freeze 1 month (MAFRL)
Total Phosphorus	0.05mg.P.g^{-1}			
Total Organic Carbon, Total Carbon	0.1% TOC, TC			Store Cold 7 days (MAFRL) Freeze 1 month (MAFRL) Nil 28 days NEPM 2013
Wet Weight, Dry Weight, Loss on Ignition (550°C + 1000°C)	N/A			Store Cold 7 days (MAFRL) Freeze 1 month (MAFRL)
Chlorophyll a	N/A	250mL PP jar	Scrape top layer of sediment core into jar and record core diameter	Keep in dark, Store Cold up to 48 hours (APHA Table 1060:I) Freeze 1 month (AS5667.1-1998)
Metals		70 mL PP jar	Fill with sediment (_80%)	Store Cold 7 days (MAFRL) Freeze 6 month (MAFRL) Nil 6 months NEPM 2013
Particle Size Distribution		312 x 200 mm sandvik zip-lock bags	Fill with ~200 mL sediment	Store Cold 24 hours (NMBAQC) Store Cold 7 days (MAFRL) Freeze 5 years (NMBAQC)