

APPENDIX 2 CONTAINERS, PRESERVATION METHODS AND HOLDING TIMES

The information in this appendix is sourced from the *AS/NZS 5667.1:1998*, unless otherwise noted. This table is not comprehensive but provides an overview of the most common analytes sampled. Where analytes are not listed in this table please refer to Australian Standards, International Standards, ASTM or APHA. This information is reproduced with the permission of Australian Standards.

Analyte	Container type	Typical volume (mL)	Filling technique	Filtration and preservation	Holding time	Notes
physical and aggregate samples						
acidity and alkalinity	plastic or glass	500	fill container completely to exclude air	refrigerate	24 hours	preferable to analyse sample in field
colour—true	plastic or glass	500	fill container completely to exclude air	refrigerate and store in the dark	2 days	
conductivity (at 25 °C)	plastic or glass	100	fill container completely to exclude air	none required	24 hours	preferably carried out in field for samples of low conductivity (<20 µS/cm)
oxygen, dissolved	glass			fix oxygen in the field and store in the dark (as per method of analysis used)	24 hours	preferably determined in the field
pH	plastic or glass	100		refrigerate	6 hours	carry out test as soon as possible and preferably in situ
solids (dissolved or suspended)	plastic or glass	500	dissolved: fill container completely to exclude air	refrigerate	24 hours	
turbidity	plastic or glass	100	fill container completely to exclude air	none required	24 hours	preferable to analyse sample in field or in situ

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metals						
aluminum barium beryllium cadmium chromium cobalt copper lead manganese molybdenum nickel silver tin vanadium zinc	acid washed, plastic or glass	100		acidify with nitric acid to pH 1 to 2	1 month	
antimony	acid washed, plastic or glass	100		acidify with nitric acid or hydrochloric acid to pH 1 to 2	1 month	hydrochloric acid should be used if hydride technique is used for analysis—consult laboratory
arsenic	acid washed, plastic or glass	500	fill container completely to exclude air	acidify with nitric acid or hydrochloric acid to pH 1 to 2	1 month	hydrochloric acid should be used if hydride technique is used for analysis—consult laboratory
boron	plastic	100	fill container completely to exclude air	none required	1 month	
chromium (VI)	acid washed, plastic or glass	100	fill container completely to exclude air	refrigerate	1 day	sample container should be rinsed thoroughly

Analyte	Container type	Typical volume (mL)	Filling technique	Filtration and preservation	Holding time	Notes
iron (II)	acid washed, plastic or glass	500	fill container completely to exclude air	acidity with hydrochloric acid to pH 1 to 2	24 hours	
iron, total	acid washed, plastic or glass	500		acidity with nitric acid to pH 1 to 2	1 month	
lithium	plastic	100		none required, but may acidify with nitric acid to pH 1 to 2 and refrigerate	1 month	acidification allows the sample to be analysed for lithium as well as other metals
magnesium	acid washed, plastic or glass	100	fill container completely to exclude air	none required	1 week	samples with pH > 8 or high carbonate content to be analysed solely for calcium, magnesium or hardness should be acidified
				acidify with nitric acid to pH 1 to 2	1 month	acidification permits determination of other metals from same sample
mercury	acid washed, glass	500		acidify with nitric acid to pH 1 to 2 and add potassium dichromate to give a 0.05% (m/v) final concentration	1 month	particular care is needed to ensure that the sample containers are free from contamination
potassium	acid washed, plastic or glass	100		none required/acidify with nitric acid to pH 1 to 2	1 month	acidification allows the sample to be analysed for potassium as well as other metals
selenium	acid washed, plastic or glass	500		acidify with nitric or hydrochloric acid to pH 1 to 2	1 month	
uranium	acid washed, plastic or glass	200		acidify with nitric acid to pH 1 to 2	1 month	

inorganic (non-metallic)

Analyte	Container type	Typical volume (mL)	Filling technique	Filtration and preservation	Holding time	Notes
ammonia	plastic or glass	500		refrigerate	6 hours	strict protocol required to reduce effects of contamination store in area free of contamination (ammonia vapour may permeate the walls of even high density polyethylene containers) pressure filtering is preferred
				field filter through 0.45 µm cellulose acetate membrane and refrigerate	24 hours	
chlorine	plastic or glass	500		keep out of direct sunlight, analyse immediately	5 minutes	this analysis should be carried out in the field within 5 minutes of sample collection
cyanide, total	plastic or glass	500		if no interfering compounds are present, then add sodium hydroxide to pH >12, refrigerate and store in the dark	24 hours	the preservation technique will depend on the interfering compounds present sulfides and oxidising agents potentially cause large errors in the determination of different cyanide forms refer to the analytical method for suitable preservation techniques
				refrigerate	1 month	
iodide	plastic or glass	500		refrigerate	1 month	
fluoride	plastic	200		none required	1 month	PTFE containers are not suitable
nitrate	plastic or glass	250		field filter through 0.45µm cellulose acetate membrane and freeze	1 month	

Analyte	Container type	Typical volume (mL)	Filling technique	Filtration and preservation	Holding time	Notes
nitrite	plastic or glass	200		refrigerate	24 hours	unfiltered sample
				immediate analysis		analyse as soon as possible after collection
phosphorus, total	plastic or glass	500		freeze	2 days	
				field filter through 0.45µm cellulose acetate membrane and freeze	1 month	
				refrigerate	24 hours	acidification not recommended for persulfate oxidation method
phosphorus, dissolved	plastic or glass	50		acidify with sulfuric acid or hydrochloric acid to pH 1 to 2, refrigerate and store in dark	1 month	
				field filter through cellulose acetate membrane and refrigerate or field filter and freeze	24 hours–1 month	
sulfate	plastic or glass	200		refrigerate	1 week	
sulfide, total	plastic or glass	500	fill container completely to exclude air	none required for field measurement. Preserve with zinc acetate for laboratory analysis	1 week (preserved)	
nitrogen, total	plastic or glass	500		refrigerate or freeze	24 hours–1 month	

Analyte	Container type	Typical volume (mL)	Filling technique	Filtration and preservation	Holding time	Notes
TKN: total Kjeldahl nitrogen	plastic or glass	500		acidify with sulfuric acid or hydrochloric acid to pH 1 to 2, refrigerate	24 hours	
				refrigerate	24 hours	
				freeze	1 month	
Organics						
biochemical oxygen demand (BOD)	plastic or glass	1000	do not pre-rinse container with sample fill container completely to exclude air	refrigerate and store in the dark	1 day	glass containers are preferable for samples with low BOD (<5 mg/L)
chemical oxygen demand (COD)	plastic or glass	100	fill container completely to exclude air	acidify with sulfuric acid to pH 1 to 2, refrigerate and store in dark	1 week	glass containers are preferable for samples with low COD (<5 mg/L)
Hydrocarbons, oil and grease	glass, solvent washed	1000	do not pre-rinse container with sample do not completely fill container ^a	refrigerate	1 day	extract on site where practical extract sample container as part of the sample extraction procedure
	plastic	100		freeze	1 month	

Analyte	Container type	Typical volume (mL)	Filling technique	Filtration and preservation	Holding time	Notes
MAH: monocyclic aromatic hydrocarbons	glass, vials with PTFE lined septum	500	fill container completely to exclude air.	Acidify with hydrochloric acid to pH 1 to 2 and refrigerate. If residual chlorine is present, for each 40ml of sample add a) 25 mg of ascorbic acid; b) 3 mg of sodium thiosulfate; or c) 3 mg of sodium sulfite	1 week	2 x 40mL vials are recommended for purge and trap analysis
PAH: polycyclic aromatic hydrocarbons	glass, solvent washed	500	do not completely fill container do not pre-rinse	refrigerate and store in the dark if sample is chlorinated, add 80 mg of sodium thiosulfate for every 1000 mL of sample to container prior to sampling	1 week	extract on site where practical extract sample container as part of the sample extraction procedure
PCBs: polychlorinated biphenyls	glass, solvent washed with PTFE cap liner	1000-3000	do not completely fill container do not pre-rinse	if sample is chlorinated, add 80 mg of sodium thiosulfate for every 1000 mL of sample to container prior to sampling	1 week	extract on site where practical extract sample container as part of the sample extraction procedure a 40 mL vial with PTFE-lined septum is recommended for micro extraction

Analyte	Container type	Typical volume (mL)	Filling technique	Filtration and preservation	Holding time	Notes
pesticides (organochlorine, organophosphorus and nitrogen-containing)	glass, solvent washed with PTFE cap liner	1000-3000	do not pre-rinse container with sample do not completely fill sample container with air	refrigerate if sample is chlorinated, add 80 mg of sodium thiosulfate for every 1000 mL of sample to container prior to sampling	7 days	extract on site where practical extract sample container as part of the sample extraction procedure
phenolic compounds (including chlorinated phenols)	amber glass, solvent washed with PTFE cap liner	1000	do not pre-rinse container sample do not completely fill container	refrigerate and store in the dark	24 hours	
				acidify to pH 1 to 2 refrigerate and store in dark if sample is chlorinated, add sodium thiosulfate to container prior to sample collection	3 weeks	
TOC: total organic carbon	amber glass with PTFE cap liner	100		acidify with sulfuric acid to pH 1-2, refrigerate and store in the dark	1 week	analyse as soon as possible phosphoric acid can be used instead of sulfuric if necessary inorganic carbon needs to be purged before analysis so volatile organic compounds will be lost
	plastic			freeze	1 month	

Microbiological / biological

Analyte	Container type	Typical volume (mL)	Filling technique	Filtration and preservation	Holding time	Notes
faecal coliforms or <i>E. coli</i> , etc	glass or plastic, sterilised.	Confirm with laboratory	do not completely fill container	for chlorinated/ chloraminated water add sodium thiosulfate to concentration 100 mg/L for samples with high heavy metals add EDTA	24 hrs (preferably < 6 hrs)	from AS/NZS 2031:2001
chlorophylls	plastic or glass	1000		refrigerate filter and freeze residue	24 hours 1 month	refrigerate in dark

radiochemical analysis

alpha and beta activity (gross)	plastic or glass	1000	no air gap	acidify with nitric acid to pH 1 to 2	1 month	
alpha and beta activity except radio-iodine	plastic	as required	no air gap	filter for soluble analysis immediately add 20 ±1 ml of 50% (v/v) nitric acid per litre of sample the pH should be < 1 refrigerate and store in the dark	analyse as soon as possible	safety precautions and shielding are dependent on the activity of this sample it is imperative that radioactive dust is not inhaled or left on clothing
gamma activity	plastic	consult laboratory		see endnote b	depends on the half-life of the radionuclide	safety precautions and shielding are dependent on the activity of this sample it is imperative that radioactive dust is not inhaled or left on clothing

Endnotes:

a Samples for oil and grease analysis should be collected in glass containers with teflon-coated equipment as these analytes will stick to the rubber tubing of automated sampling equipment resulting in an unrepresentative sample.

b If there is suspended matter and a separate measurement is required, or the solids are not readily dissolved, filter the sample and treat as two separate samples. Add quantitatively to the sample a known amount of solution containing non-radioactive isotopes of interest. For samples containing metals, the solution is usually acidified to a pH of less than 2; the acid used should not precipitate or volatilise the elements of interest. Refrigerate and store in the dark.

Notes from
AS/NZS
5667.1:1998

Plastic = plastic containers, eg polyethylene, PTFE, polypropylene, PET and similar. Glass = borosilicate glass container. Vials are flat-bottomed borosilicate glass vials, typically 30-50 mL capacity with screw caps. The caps should have PTFE faced septa, or liner.

The preservation technique will depend on the method of analysis to be used. Other methods of preservation may be suitable and prior liaison with the analytical laboratory is required.

Refrigerate = cool to between 1°C and 4°C (see clause 11.2.2 of AS). Freeze = freeze to -20°C (see clause 11.2.3 of AS)