

Minimum Sample Volumes for Common Environmental Analytical Methods

Preservation Type	Analytes	Method Reference	Reporting Limit	SW 846 Normal R'qd	"Easily accepted" minimum vol (in mL) for one analysis ¹	Common number of reruns	Comments
Unpreserved (Must be collected in separate bottle)	Alkalinity	310.1*	2.0 mg/L	200	10	1	Titration to pH 4.5
Unpreserved (Can be combined in one container)	Anions by IC (Cl, Br, NO ₃ , SO ₄)	300*/9056A**	Cl, NO ₃ , SO ₄ : 1.0 mg/L Br: 0.5 mg/L	50	5	3	by IC, all samples start at 1/10 dilution, standard curve concentrations are therefore lower by a factor of 10.
	BOD, using 60 mL bottles	405.1*	2.0 mg/L	100	100	1	Assumes use of 60 mL bottles, set at 1/1, 1/3, 1/30 & 1/100 dilution. Dissolved Oxygen meter/probe, PQL is based upon the minimum amount of D.O. uptake required by the method (2.0 mg/L) multiplied by sample dilution factor.
	Hex Chromium	7196 M	0.5 mg/L	300	5	1	Sequential or flow-injection colorimetry, using 4 mL sample cups.
	Perchlorate	314	4 µg/L	50	25	1	Must have enough sample to run conductivity test and filter in cases of high chloride, sulfate, etc.
	Perchlorate	9058	4 µg/L	50	10	1	No conductivity test required.
	TDS	160.1*	10 mg/L	200	100	1	Gravimetric
	TDS	160.1*	50 mg/L	200	20	1	Gravimetric
Sulfuric Acid	COD	410.4*	5 mg/L	100	5	1	Hach COD digestion tubes (p/n 21259-15: high level, 21258.15: low-level) using 2 mLs/tube.
	NH ₃ , w/out dist.	350.1*	0.05 mg/L	100	5	1	Sequential or flow-injection colorimetry, using 4 or 8 mL sample cups, assuming no distillation required
	TKN	351.2*	2.0 mg/L	500	20	1	Up to ~5 dilutions from 1 distillation, but no repeat distillations. Block digestion using 20 mL of sample, followed by sequential or flow-injection colorimetry using 4 or 8 mL sample vials.
	Phenols, distilled	420.2*	0.005 mg/L	100	50	1	In-line sequential-flow distillation followed by colorimetry.
	Dissolved gases (Methane, ethane, ethene)	RSK 175	5 µg/L	120	40	1	Using GC FID TCD
Sulfuric Acid	TOC	415.1*	1.0 mg/L	120	50	1	UV or heated - persulfate TOC analyzer, with 40-mL VOA vial autosampler
Nitric Acid	Total Hardness	130.2*	2.0 mg/L	100	10	1	Titration to sky-blue endpoint
	RCRA or CAM Title 22	6010	See attached list	250	25	1	
	RCRA or CAM Title 22	6020	See attached list	250	25	1	
	RCRA or CAM Title 22	7000 Series	See attached list	250	25	1	
	Mercury	7470	0.001 mg/L	250	50	1	Hotblock digester
Sodium Hydroxide	Total Cyanide	335.4*/9012	0.02 mg/L	500	50	1	Please note 335.4 and 9012 are the same - differences are in QC requirements. (335.4 ICV acceptance: 90-110 and LCS: 90-110; 9012 ICV: 85-115 and LCS: 74-123). Midi distillation of 50 mL sample, followed by sequential or flow-injection colorimetry.
Zinc Acetate + Sodium Hydroxide	Total Sulfide	376.1*	1.0 mg/L	100	60	1	No headspace, 60-mL BOD bottle.
		9030B*	1.0 mg/L	100	100	1	Midi distillation required 100 mL sample.
Hydrochloric acid	Volatiles	8260	See attached list	140	20	1	If separate 40-mL vials are used for each 20 mL aliquot, inert material is need to occupy the remaining 20 mL. Approved inert material should be used. Alternatively, 20-mL vials can be used.
Unpreserved (SVOCs)	BNAs	8270	See attached list	1000	250	1	Can use 100 mL, but RLs will be higher than AFCEE 3.1 QAPP
	Pesticides	8081	See attached list	1000	100	1	
	PCBs (1016,1221, 1232, 1242, 1248, 1254, & 1260)	8082	0.5 µg/L	1000	100	1	100 mL extracted by separatory funnel (3510) and concentrated to 1.0 mL, 2 µL injection dual column GC/ECD analysis.
	Herbicides	8151	See attached list	1000	100	1	

¹ The sample volume in this column assumes that the analytical technique referenced will be employed with little or no modification, that the reporting limit will remain at the standard reporting limit, and that the cost of analysis would be essentially the same as the cost of the method performed using the SW-846 recommended preparation volume. If a modification is necessary to achieve the smaller sample volume, then the modification is of no or minor consequence to the performance of the method and would be "easily accepted" by almost all state and federal regulators that review environmental methods. Sample volumes even lower than those indicated in this column can be achieved through the use of other analytical techniques. However, regulatory approval might be necessary for non-standard technologies and methods and analysis pricing may be higher.

* Are not SW 846 methods and/or not in AFCEE QAPP 3.1, but are commonly requested groundwater tests for long-term monitoring projects.

** Stipulated in AFCEE QAPP 3.0 to be run by EPA Method 300.0.