MAKMAL KUALITI AIR,
INSTITUT PENYELIDIKAN AIR KEBANGSAAN MALAYSIA (NAHRIM)
JADUAL PERKHIDMATAN ANALISIS

TARIKH KEMASKINI: 20 MAC 2024

CHEMICAL ANALYSIS											
No	**Parameter**	**Unit**	**Cont.**	**LOR**	**Preservation**	**Holding Time**	**Method**	**Typical Volume Needed**	**Reporting at COA (d.p. / s.n)**		**Matrix**
PHYSICAL & AGGREATE PROPERTIES											
1	Turbidity	NTU	P,G	<0.5	Analyze same day; Store in dark, Cool ≤ 6°C	24 hours	APHA 2310 B	50 mL	Turbidity Range *NTU* 0 - 1 1-10 10-40 40-100 100-400 400-1000 >1000	Report to the Nearest *NTU* 0.05 0.1 1 5 10 50 100	Water & Waste Water
2	Conductivity	µS/cm	P,G	< 0.5	Cool ≤ 6°C	28 days	HACH Method 8160, 10th Edition, 2021	100 mL	0		Surface Water Drinking Water
3	Color	Pt-Co	P,G	< 5	Cool ≤ 6°C	48 hours	HACH Method 8025, 10th Edition, 2014	100 mL	Follow LOQ		Surface Water Drinking Water
4	*Odour	Threshold Odour Number (TON)	G (Amber)		Cool <10°C	6 hours	APHA 2150 B	1 L			Surface water Drinking water
	SOLIDS										
5	Total Suspended Solids	mg/L	P,G	< 10	Cool ≤ 6°C	7 days	APHA 2540 D	1 L	Follow LOQ		Water & Waste Water
6	Total Dissolved Solids						APHA 2540 C				
7	Total Solids						APHA 2540 B				
8	Hardness by Calculation	$CaCO_3$mg/L	P	< 0.50	Cool ≤ 6°C	7 days	APHA 2340 B, 23rd Edition, 2017 & In-house test method MKA TM04 by Ion Chromatography	100 mL	0.00		Surface Water Drinking Water Waste Water
9	Total Hardness	$CaCO_3$ mg/L	P,G	< 6	HNO_3 or H_2SO_4 to pH≤2	7 days	HACH Method 8226, 8th Edition, 2015	100 mL	Follow LOQ		Surface Water Ground Water Drinking Water
10	*Salinity	%	G, wax seall		Analyze immediately or use wax seal	6 months (use wax seal)	APHA 2520 B	250 mL			
11	Alkalinity	mg/L	P,G	< 5	Cool ≤ 6°C	24 hours	HACH Method 8221, 9th Edition, 2017	100	Follow LOQ		Drinking water

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12	pH		P,G		Analyze Immediately	0.25 hours	APHA 4500-H^+ B	50 mL	0.00@ temperature (^{0}C)	Water & Waste Water
13	Dissolved Oxygen	mg/L	P,G	< 1.0	None required	Immediately	APHA 4500-O G	1000 mL	0	Water & Waste Water
14	Silica	mg/L	P	< 1	Cool ≤ 6ºC	28 days	HACH Method 8185, 9th Edition, 2014	50 mL	Follow LOQ	Surface Water Ground Water Drinking Water
15	*Chlorine, Free	mg/L	G	<0.03	Analyzed immediately	Analyzed immediately	HACH Method 8021, 9th Edition, 2014	50 mL	Follow LOQ	Drinking Water (bottle)
16	*Chlorine, Total	mg/L	G	<0.03	Analyzed immediately	Analyzed immediately	HACH Method 8167, 11th Edition, 2022	50 mL	Follow LOQ	Drinking Water (bottle) Treated Water Surface Water
17	Ammoniacal Nitrogen,NH_3–N	mg/L	P,G	<0.1	Add H_2SO_4 to pH<2,	28 days	APHA 4500-NH_3 B & HACH Method 8038, 9th Edition, 2017	250 mL	0.0	Water & Waste Water
18	Nitrogen, Ammonia, NH_3–N	mg/L	P,G	<0.1	Add H_2SO_4 to pH<2, Store in dark, Cool ≤ 6ºC	28 days	HACH Method 10001, 10th Edition, 2021	250 mL	0.0	Drinking Water Treated Water Surface Water Ground Water Effluent Water
19	Total Nitrogen	mg/L	G	<0.2	Add HCl to pH<2,	7 days	In-house test method MKA TM03 by TOC/TN Analyzer	500 mL	0.0	Water & Waste Water
20	Total Phosphorus, PO_4-P	mg/L	P, G	< 0.05	Add H_2SO_4 or HCl to pH<2, Cool ≤ 6ºC	28 days	HACH Method 8190, 10th Edition, 2017	50 mL	0.00	Surface Water Drinking Water Waste Water
	ANIONS									
21	Fluoride, F^-	mg/L	P	< 0.02	Cool ≤ 6ºC	48 hous	APHA 4110 B	100 mL	0.00	Water & Waste Water
22	Chloride, Cl^-			< 0.07						
23	Nitrite, NO_2^-			< 0.05						
24	Bromide, Br^-			< 0.09						
25	Nitrate, NO_3^-			< 0.16						
26	Phosphate, PO_4^{3-}			< 0.16						
27	Sulfate, SO_4^{2-}			< 0.09						
	CATIONS									
28	Lithium, Li^+	mg/L	P	< 0.01	Cool ≤ 6ºC	7 days	In-house test method MKA TM04 by Ion Chromatography	100 mL	0.00	Water & Waste Water
29	Sodium, Na^+			< 0.01						
30	Ammonium, NH_4^+			< 0.03						
31	Potassium, K^+			<0.06						
32	Magnesium, Mg^{2+}			< 0.03						
33	Calcium, Ca^{2+}			< 0.15						

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METALS & HEAVY METAL										
34	Mercury, Hg	µg/L	P,G	< 1.00	Add HNO_3 to pH <2, Cool ≤ 6ºC	28 days	In-house test method MKA TM02 based on APHA 3112 B	500 mL	0.00	Water & Waste Water
	METALS									
35	Lead, Pb	mg/L	P, G	< 0.01	Add HNO_3 to pH <2, Cool ≤ 6ºC	6 months	APHA 3030 F and APHA 3120 B	500 mL	follow LOQ	Water & Waste Water
36	Zinc, Zn			< 0.01						
37	Aluminum, Al			< 0.01						
				< 0.02						
38	Nickel, Ni			< 0.005						
39	Chromium, Cr			< 0.01						
40	Iron, Fe			< 0.20						
41	Boron, B			< 0.01						
42	Cuprum, Cu			< 0.005						
43	*Selenium, Se			< 0.01						
44	*Argentum, Ag			< 0.005						
45	*Tin, Sn (in house)			< 0.01						
46	*Barium, Ba			< 0.005						
47	*Manganese, Mn			< 0.005						
48	*Cadmium, Cd			< 0.005						
49	*Arsenic, As			< 0.02						
50	*Magnesium, Mg			< 0.05						
51	* Natrium, Na			< 0.05						
52	*Calcium, Ca			< 0.60						
AGGREGATE ORGANICS CONSTITUENTS										
53	Biochemical Oxygen Demand (BOD_5)	mg/L	P,G	< 1.0	Cool ≤ 6ºC	2 days	APHA 4500-O G and APHA 5210 B	1L	0.0	Water & Waste Water
54	Chemical Oxygen Demand (COD)	mg/L	P,G	< 2.5	Add H_2SO_4 to pH<2, Cool ≤ 6ºC	28 days	In-house test method MKA TM01 based on HACH Method 8000, 12th Edition, 2021	50 mL	0.0	Water & Waste Water
55	Oil & Grease	mg/L	G	< 1.0	Add H_2SO_4 to pH<2, Cool ≤ 6ºC	28 days	APHA 5520 D	500 mL	0.00	Water & Waste Water
56	Total Organic Carbon	mg/L	G	<0.2	Add HCl to pH<2, Store in dark, Cool ≤ 6ºC	28 days	APHA 5310 B	1 L	0.0	Water & Waste Water
57	Inorganic Carbon									
58	Total Carbon									

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ORGANICS COMPOUNDS										
	Organochlorine Pesticides (OCPs)									
59	Hexachlorobenze	mg/L	G (Amber)	< 0.001	Cool ≤ 6ºC,add L-Ascorbic acid(0.1 g/L), EDTA acid trisodium salt (0.35 g/L), Potassium dihydrogen citrate (9.4 g/L)	Extract (14 days) Analyzed (40 days)	EPA METHOD 525.3, 8th Edition, 2012	1 L	follow LOQ	Drinking water
60	BHC-gamma (lindane)			< 0.002						
61	Heptachlor			< 0.01						
62	Aldrin			< 0.005						
63	Heptachlor epoxide			< 0.01						
64	trans-chlordane			< 0.0002						
65	Endosulfan			< 0.03						
66	cis-chlordane			< 0.002						
67	Dieldrin			< 0.002						
68	p,p'-DDT			< 0.008						
69	p,p'-Methoxychlor			< 0.02						
	Volatile Organic Compunds (VOCs)									
70	*1,1-Dichloroethene			<5						
71	*Methylene chloride			<5						
72	*trans-1,2-Dichloroethene			<2						
73	*1,1-Dichloroethane			<5						
74	*2,2-Dichloropropane			<2						
75	*cis-1,2-Dichloroethene			<5						
76	*Bromochloromethane			<2						
77	*Chloroform			<5						
78	*1,1,1-Trichloroethane			<2						
79	*Carbon tetrachloride			<5						
80	*1,1-Dichloropropene			<5						
81	*Benzene			<2						
82	*1,2-Dichloroethane			<2						
83	*Trichloroethene			<5						
84	*1,2-Dichloropropane			<2						
85	*Dibromomethane			<2						
86	*Bromodichloromethane			<5						
87	*cis-1,3-Dichloropropene			<5						
88	*Toluene			<2						
89	*trans-1,3-Dichloropropene			<5						
90	*1,1,2-Trichloroethane			<2						
91	*Tetrachloroethene			<5						
92	*1,3-Dichloropropane			<5						
93	*Dibromochloromethane			<5						
94	*1,2-Dibromoethane			<5						

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95	*Chlorobenzene	ug/L	G (PTFE-lined cap)	<2	Cool ≤ 6ºC,	7days	METHOD 8260D EPA METHOD 525.3, 8th Edition, 2012	40mL glass vial	follow LOQ (0.00)	Drinking water
96	*1,1,1,2-Tetrachloroethane			<2						
97	*Ethylbenzene			<2						
98	*m+ p-Xylene			<2						
99	*o-Xylene			<5						
100	*Styrene			<5						
101	*Bromoform			<5						
102	*Isopropylbenzene			<2						
103	*Bromobenzene			<2						
104	*1,1,2,2-Tetrachloroethane			<5						
105	*1,2,3-Trichloropropane			<2						
106	*n-Propylbenzene			<2						
107	*2-Chlorotoluene			<2						
108	*1,3,5-Trimethylbenzene			<2						
109	*4-Chlorotoluene			<5						
110	*tert-Butylbenzene			<5						
111	*1,2,4-Trimethylbenzene			<5						
112	*sec-Butylbenzene			<5						
113	*1,3-Dichlorobenzene			<5						
114	*p-Isopropyltoluene			<5						
115	*1,4-Dichlorobenzene			<5						
116	*n-Butylbenzene			<5						
117	*1,2-Dichlorobenzene			<5						
118	*1,2-Dibromo-3-chloropropane			<5						
119	*1,2,4-Trichlorobenzene			<5						
120	*Hexachlorobutadiene			<5						
121	*Naphthalene			<5						
122	*1,2,3-Trichlorobenzene			<5						
	Phenol									
123	Bisphenol A	µg/L	G (Amber)	< 2.0	Add H_2SO_4 to pH<2, Cool ≤ 6ºC	Extract (14 days) Analysis (40 days)	In-house test method MKA TM06 based on Agilent Application Note 5991-1412EN, 2012	250 mL	follow LOQ	Drinking water
124	Bisphenol S									
	***Pharmaceutical**									
125	Acetylsalisylic Acid	µg/L	G (Amber)	0.20	Add Sodium azide (0.25g), Cool ≤ 6º C	Extract (14 days) Analyzed (40 days)	In-house test method MKA TM08 based on Agilent Application Note 5991-6115EN, 2015	250 mL	follow LOQ	Drinking water Tap water
126	Gliclazide			0.10						
127	Ibuprofen			0.25						
128	Diclofenac			0.10						

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No	MICROBIOLOGICAL ANALYSIS									
	Parameter	Unit	Cont.	LOR	Preservation	Holding Time	Method	Typical Volume Needed	Reporting at COA	Matrix
1	Total Coliform Count	cfu/100 mL	P, G (Sterile)	<1	Cool <10°C	24 hours	In-house test method MKA TM 05 based APHA 9222 J	100 mL	1 - 999 0.00 x 10^x (for ≥1000 count)	Surface Water Ground Water Wastewater
2	*E. coli* Count	cfu/100 mL								
3	*Pseudomonas aeruginosa* Count	cfu/100 mL			Cool <10°C	24 hours	APHA 9213 E, 23rd Edition, 2017 (Membrane Filtration)	100 mL		Drinking water Ground Water
4	*Clostridium perfringens* Count	cfu/100 mL			Cool <10°C	24 hours	Methods for the Examination of Waters and Associated Materials - The Microbiology of Drinking Water (2021) - Part 6	100 mL		Drinking water
5	Sulfite Reducing Clostridia Count									
6	Thermotolerant (Fecal) Coliform Count	cfu/100 mL			Cool <10°C	24 hours	APHA 9222 D, 23rd Edition, 2017 (Membrane Filtration)	100 mL		Wastewater Surface water Ground water
7	Fecal Enterococcus/Streptococcus Count	cfu/100 mL			Cool <10°C	24 hours	APHA 9230 C, 23rd Edition, 2017 (Membrane Filtration)	100 mL		Drinking water Ground Water
8	Total Coliform Count	MPN/100 mL		<1	Cool <10°C	24 hours	In-house test method MKA TM07 based on Colilert Test Kit notes, IDEXX Laboratories Inc. USA, 2019	100 mL		Drinking water
9	*E. coli* Count	MPN/100 mL								

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10	Heterotrophic Plate Count at 37 °C	cfu/ mL		<1	Cool <10°C	24 hours	Methods for the Examination of Waters and Associated Materials – The Microbiology of Drinking Water (2020) – Part 7	100 mL		Drinking water Surface water
11	Heterotrophic Plate Count at 22 °C									
12	Fungi Count	cfu/mL		<5	Cool <10°C	24 hours	APHA 9610 C	100 mL		Drinking water Surface water
13	*Vibrio sp.	Detected/ non-detectd			Cool <10°C	24 hours	Methods for the Examination of Waters and Associated Materials (2016) - Part 9, Standing Committee of Analysts, UK	1L-surface water 100 mL - wastewater	Detected/ non-detectd	Surface water wastewater
14	*Salmonella sp.	Detected/ non-detectd			Cool <10°C	24 hours	Methods for the Examination of Waters and Associated Materials (2016) - Part 8, Standing Committee of Analysts, UK			
15	*E.coli* count	cfu/100 mL		<1	Cool <10°C	24 hours	Tricycle Protocol for WHO Integrated Global Surveillance on ESBL *E.coli*, 2021	1000 mL	1 - 999 0.00 x 10^{x} (for ≥1000 count)	Surface water Wastewater
16	Extended spectrum beta lactamase *E.coli* (ESBL *E.coli*) Count									
17	*SARS CoV-2	Detected/non-detected	P, G (Sterile)		Cool <10°C	24 hours	In house test method based on Ahmed et al. 2020	1000 mL	Detect/ non-detectd	Wastewater
BIOLOGY										
18	*Chlorophyll-a	µg/L	G		Cool <10°C	24 hours	APHA 10200 H	200 mL	0.00	Surface water

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