

Intercomparison 1630

pH, conductivity, alkalinity, nitrate, TOC,
major ions and trace metals

ICP Waters report 129/2016

Intercomparison 1630:

pH, Conductivity, Alkalinity, NO₃-N, Cl, SO₄, Ca, Mg, Na, K,
TOC, Al, Fe, Mn, Cd, Pb, Cu, Ni and Zn



The international Cooperative Programme on Assessment
and Monitoring Effects of Air Pollution on Rivers and Lakes
(ICP Waters)
Convention on Long-Range Transboundary Air Pollution



Intercomp number 30



Participation in intercomparison 1630

- 89 laboratories were invited to participate
- 35 laboratories from 20 countries accepted the invitation and submitted results for one or more parameters

Participation

Country	No. of labs.	Country	No. of labs.
Austria	1	Netherlands	1
Canada	1	Norway	1
Czech Republic	1	Poland	2
Estonia	1	Russia	6
Finland	2	Serbia	1
France	1	Spain	1
Germany	6	Sweden	1
Ireland	2	Switzerland	1
Italy	1	UK	3
Lithuania	1	USA	1

Preparation of the samples

- Water (50 L) was collected from Hakadal Verk (north of Oslo)
- Filtered (0,45 μm), stored at room temperature and left to equilibrate with atmosphere
- pH was lowered with addition of HCl and H_2SO_4 (sample set AB). Sample A diluted with MQ water.
- Sample set CD was spiked with metals and conserved (0.33 % HNO_3)

Results

				Acceptable Limit	Acceptable results (%)				
Variable	Sample pair	Sample 1	Sample 2	%	1630	1529	1428	1327	1226
pH	AB	6.00	6.04	3.3	56	64	68	52	59
Conductivity.	AB	4.08	4.59	10	77	89	93	78	72
Alkalinity.	AB	0.042	0.046	20	46	75	26	63	48
Nitrate + nitrite-nitrogen.	AB	276	309	20	71	88	14	0	52
Chloride.	AB	2.45	2.81	20	87	97	93	78	79
Sulphate.	AB	8.07	9.2	20	90	97	87	77	80
Calcium.	AB	3.9	4.42	20	93	97	97	85	75
Magnesium.	AB	0.41	0.47	20	89	100	87	82	74
Sodium.	AB	1.87	2.14	20	96	97	97	91	84
Potassium.	AB	0.43	0.49	20	86	97	97	70	81
Total organic carbon.	AB	4.09	4.65	20	81	70	82	78	76
Aluminium.	CD	255	270	20	78	89	78	89	79
Iron.	CD	186	190	20	91	81	74	72	70
Manganese.	CD	48	51.7	20	91	84	88	78	89
Cadmium.	CD	6.87	7.73	20	90	100	84	85	84
Lead.	CD	7.23	8.34	20	86	77	80	71	77
Copper.	CD	24.6	28	20	86	93	88	84	86
Nickel.	CD	10.2	11.5	20	90	97	92	83	78
Zinc.	CD	34.4	38.1	20	81	83	79	60	61
Total					81	88	80	73	74

Units: Conductivity: mS/m
Alkalinity: mmol/l
Nitrate+nitrite-N: µg N/l

Cl. SO₄. Ca. Mg. Na. K. TOC: mg/l
Al. Fe. Mn. Cd. Pb. Cu. Ni. Zn: µg/l

pH

Analytical variable and method	Sample	TRUE Value		No. lab.		Avg/Std.av.	
		S. 1	S. 2	Total	Omm.	Sample 1	
pH	AB	6.00	6.04	32	0	6.04	0.25
Electrometry				25	0	6.04	0.24
Stirring				4	0	5.89	0.17
Equilibration				2	0	6.37	
Other method				1	0	6.05	
Alkalinity	AB	0.042	0.046	24	8	0.041	0.007
Gran plot titration				9	1	0.044	0.008
End point titration				8	3	0.039	0.005
End point				2	2	0.079	
Other method				2	1	0.040	
Colorimetry				1	1	2.400	
End point 5.4				1	0	0.036	
End point 5.6				1	0	0.042	

Conclusions

- Accuracy in determination of major ions was very good (> 85 % had target accuracy < 20 %)
- Accuracy for trace metals and Fe was good (> 80 % had target accuracy better than 20 %)
- Accuracy for NO₃, TOC and Al was fair (70-80% had target accuracy < 20 %)
- Accuracy for pH and alkalinity was poor (56 % or less had target accuracy better than 0.2 units and 20 %, respectively)

Intercomparison test 1731

- Will include phosphorous
- Free for labs within UN-ECE and EECCA that deliver results to national monitoring programs. Others have to pay a minor fee

Plan for Intercomp 1731

- 24 May : Deadline for registration in the database
- Week 24: Samples delivered to the participants
- 5 September: Deadline for reporting results in the database
- Week 46: Report available
- Interested parties can contact carlos.escudero@niva.no