

METHOD STATEMENT



Determinand:

Manual determination of Turbidity.

Matrix:

Sample Types: Raw and Potable waters.

Principle of Method:

This method uses a Hach Turbidimeter model TU5200.

Turbidity is an expression of the optical property of a liquid that causes light to be scattered and absorbed rather than transmitted in straight lines through the sample. Turbidity is the measure of particulate and colloidal matter suspended in a solution and is used to measure the clarity of water for public health and aesthetic reasons.

The Turbidity of a sample is measured nephelometrically and the units of measurement are Nephelometric Turbidity Units (NTU).

Sampling and Sample Preparation:

Samples are normally collected in 500 ml PET bottles. Other size PET bottles are also suitable. Other bottle types may also be used providing they do not contain any preservatives.

If analysis cannot be immediately undertaken, samples should be stored at a temperature of $3 \pm 2^\circ\text{C}$ until the day of analysis. Samples should be allowed to equilibrate to room temperature prior to analysis, to prevent condensation on the sample cells, and analysed within 4 days of sampling.

Interferences

The nephelometric method of turbidity measurement depends on light scattering from suspended particles. Air bubbles in the vial as well as fingerprints, dirt and condensation on the cell, will cause interference with scattering of the light, causing artificially high results.

Performance of Method:

Range of Application:

LOQ - 4000 NTU (using five calibration standards).

Any sample result that exceeds 4000 NTU should be recorded as >4000 NTU as sample dilution is not appropriate for this method.

Asset Number	Meter Name	Reporting Limit
2731	Turb1	0.13 NTU
2732	Turb2	0.11 NTU
2733	Turb3	0.12 NTU
3037	Turb4	0.05 NTU

As assets are the same specification, the method reporting limit is 0.13NTU.

Limit of Quantification:

Asset Number	Meter Name	LOQ
2731	Turb1	0.127510 NTU
2732	Turb2	0.108314 NTU
2733	Turb3	0.115365 NTU
3037	Turb4	0.046953 NTU



Recoveries of Compounds and Uncertainty of measurement:

Turbidity meter 1 (Asset 2731)

Sample type	Mean sample result (NTU)	Mean sample spike result (NTU)	Conc. of spike (NTU)	Spike recovery (%)	% Uncertainty	Mean sample spike result (NTU)	Conc. of spike (NTU)	Spike recovery (%)	% uncertainty
Potable Meltham tap (soft)	0.127	1.102	1.0	97.50	3.04	4.037	4.0	97.76	0.71
Potable Wakefield tap (medium)	0.164	1.175	1.0	101.09	3.12	4.079	4.0	97.88	0.83
Potable Doncaster tap (hard)	0.095	1.106	1.0	101.05	4.02	4.073	4.0	99.44	0.45
Raw Goosehouse borehole (groundwater)	0.174	1.100	0.9	102.87	5.04	4.104	4.0	98.24	1.00
Raw River Hull water (surfacewater)	0.216	1.069	0.7	121.84	5.36	4.024	4.0	95.20	0.82
MilliQ water (ultrapure)	0.084	1.105	1.0	102.07	2.46	4.060	4.0	99.39	0.96

Turbidity meter 2 (asset 2732)

Sample type	Mean sample result (NTU)	Mean sample spike result (NTU)	Conc. of spike (NTU)	Spike recovery (%)	% Uncertainty	Mean sample spike result (NTU)	Conc. of spike (NTU)	Spike recovery (%)	% uncertainty
Potable Meltham tap (soft)	0.120	1.110	1.0	98.91	3.97	4.017	4.0	97.41%	1.05
Potable Wakefield tap (medium)	0.161	1.166	1.0	100.53	3.68	4.046	4.0	97.13%	0.85
Potable Doncaster tap (hard)	0.084	1.110	1.0	102.61	3.06	4.045	4.0	99.03%	0.43
Raw Goosehouse borehole (groundwater)	0.161	1.071	0.9	101.17	4.48	4.097	4.0	98.40%	1.38
Raw River Hull water (surfacewater)	0.207	1.089	0.7	126.01	7.74	4.008	4.0	95.02%	1.11
MilliQ water (ultrapure)	0.082	1.090	1.0	100.82	3.24	4.035	4.0	98.84%	0.92

METHOD STATEMENT



Turbidity meter 3 (asset 2733)

Sample type	Mean sample result (NTU)	Mean sample spike result (NTU)	Conc. of spike (NTU)	Spike recovery (%)	% Uncertainty	Mean sample spike result (NTU)	Conc. of spike (NTU)	Spike recovery (%)	% uncertainty
Potable Meltham tap (soft)	0.129	1.109	1.0	98.05	3.53	4.030	4.0	97.53	1.07
Potable Wakefield tap (medium)	0.168	1.149	1.0	98.09	3.55	4.036	4.0	96.72	1.11
Potable Doncaster tap (hard)	0.091	1.101	1.0	101.05	2.68	4.034	4.0	98.58	0.92
Raw Goosehouse borehole (groundwater)	0.165	1.086	0.9	102.33	3.95	4.078	4.0	97.82	1.21
Raw River Hull water (surfacewater)	0.206	1.077	0.7	124.40	5.94	4.070	4.0	96.61	1.00
MilliQ water (ultrapure)	0.072	1.121	1.0	104.97	3.48	4.041	4.0	99.23	0.72

Turbidity meter 4 (asset 3037)

Sample type	Mean sample result (NTU)	Mean sample spike result (NTU)	Conc. of spike (NTU)	Spike recovery (%)	% Uncertainty	Mean sample spike result (NTU)	Conc. of spike (NTU)	Spike recovery (%)	% uncertainty
Elvington treated (hard)	0.083	1.081	1.0	99.87	2.59	4.053	4.0	99.25	1.01

References:

Colour and Turbidity of Waters 1981(HMSO), Methods for the examination of Waters and Associated Materials. ISBN 0117519553