

Water determination in insulating liquids



Matrix type: Insulating liquids are a family of products that provide thermal dissipation and electrical insulation inside power transformers. In this study, we are going to work with a mineral oil, which is the most widely used throughout the world.

Equipment used (Brand and model): Metrohm 737 KF Coulometer and Mettler Toledo PG503-S.

Sample pre-treatment: No pre-treatment is required by standard IEC 60814 section 2 direct injection.

Titration procedure: Coulometric titration without diaphragm, direct injection. The typical water content in mineral oils ranges from 5 mg/kg to 40 mg/kg. Therefore, we usually inject between 1g and 2g of the sample in the titration cell.

Reagents and standards used:

Aquagent® Coulometric AG (AQ0058)

No additives or buffers have been used in this study.

Results:

We present two different exercises. First, we performed a test to check the repeatability over three days, which is the maximum time that samples are stored until the test begins.

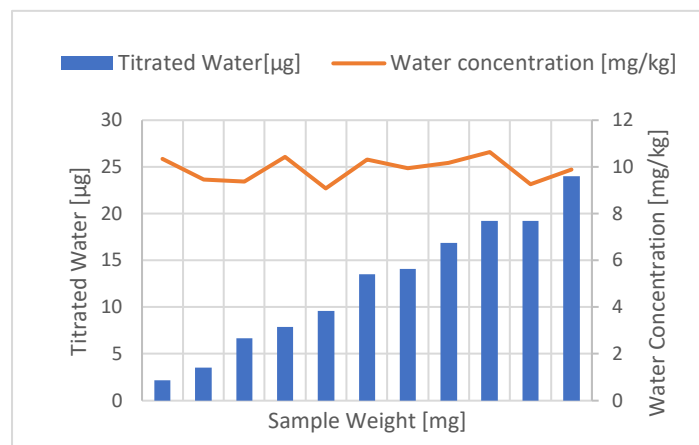
Day	Sample Weight [mg]	Deviation [µg/min]	Titration time [s]	Titrated Water [µg]	Water concentration [mg/kg]
3	968	6	28	11,6	12
3	983	6	25	10,1	10
3	1112	6	28	12,1	11
3	1050	4	29	11,4	11
Mean [mg/kg]					10,9
s [mg/kg]					0,7
s rel					6,5%
2	1128	6	28	12,4	11
2	1140	4	31	13,1	11
2	855	6	23	8,4	10
2	999	4	27	9,4	9
Mean [mg/kg]					10,9
s [mg/kg]					0,7
s rel					6,5%
1	923	4	29	10,6	11
1	900	6	27	10,3	11
1	1019	4	32	12,9	13
1	1035	4	32	13,0	13
Mean [mg/kg]					10,9
s [mg/kg]					0,7
s rel					6,5%

APPLICATION NOTE

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Sample Weight [mg]	Titrated Water [µg]	Water concentration [mg/kg]
200	2,2	10
356	3,5	9
701	6,7	9
745	7,9	10
1043	9,6	9
1296	13,5	10
1406	14,1	10
1649	16,9	10
1793	19,2	11
2061	19,2	9
2417	24,0	10



Comments: The water determination were both fast and repeatable. Aquagent® Coulometric AG is suitable for water determinations in insulating mineral oils with very low water content.