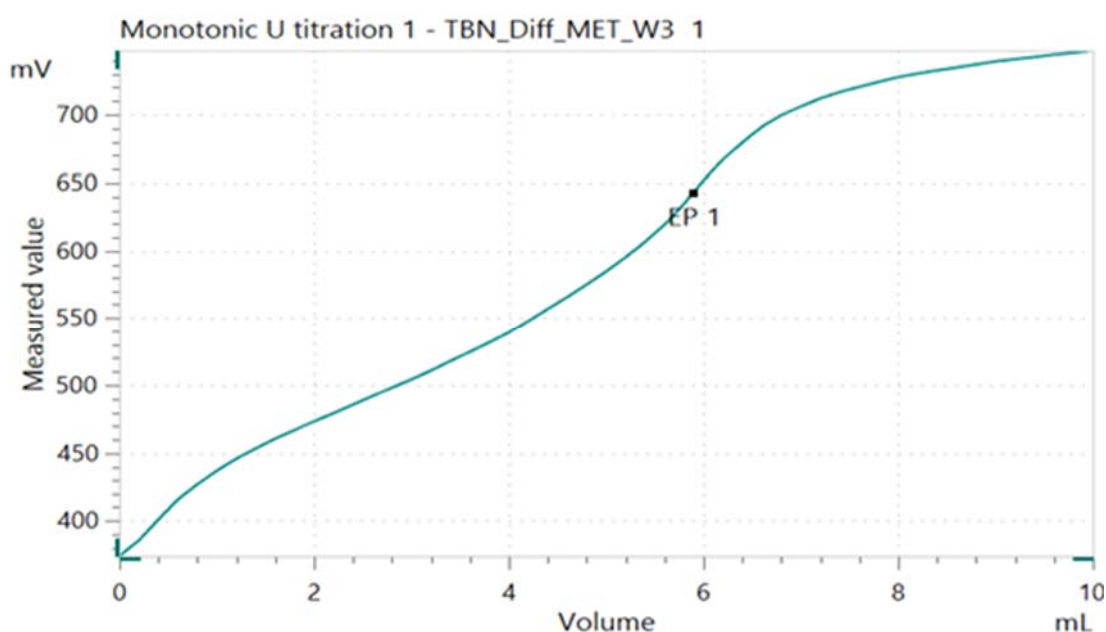


Determination of the acid number and base number in used motor oil by differential amplification



For titrations in low conducting media (e.g., non-aqueous titrations) the potentiometric indication can be disturbed by interfering signals. When differential amplification is used, these signals are measured by both the measuring electrode and the reference electrode and thus neutralized. It is therefore possible to obtain smoother titration curves and more reproducible results.

This Application Note describes the potentiometric determination of the acid number and base number in used motor oil by the differential amplification using a fully automated OMNIS system.

Method description

Sample

Used motor oil

Analysis

4 – 7 g sample is accurately weighted into a sample beaker. 60 mL of solvent is automatically added. The sample is then titrated until after the endpoint with the corresponding titrant.

After the titration, the electrode and buret tip are rinsed first with the solvent mixture followed by IPA and then CO₂-free H₂O. In order to rehydrate the membrane, the electrode, is placed for 3 to 5 min in dist. H₂O. Before the next measurement, the electrode is rinsed with IPA.

Configuration

Main module Pick&Place S	2.1010.0010
"Peristaltic" (4-channel) pump module	2.1016.0110
"Peristaltic" (2-channel) pump module – accessory set, 2x	6.05001.010
Pick&Place module , 2x	2.1014.0010
Gripper fingers 42.8 - 65 mm	6.02601.010
OMNIS sample rack 16 x 120 mL, 2x	6.02041.030
Titration head 3xNS14 / 4 x 6.4 mm (P&P)	6.01403.030
Beaker adapter for OMNIS 120 mL PP sample beaker (4x)	6.01404.030
Rod Stirrer "Sample Robot", 2x	2.1006.0010
Stirring propeller 30 mm ETFE, 2x	6.01900.010
OMNIS Titrator, professional license	2.1001.0010
OMNIS Dosing Module, 3x	2.1003.0010
Cable MDL PL/SO 1 m, 2x	6.02102.020
Cable MDL PL/SO 0.5 m	6.02102.010
Analog measuring module	6.02101.010
Electrode cable plug-in head G / plug P, 1.5 m, 2x	6.02104.010
OMNIS 20 mL cylinder unit, 2x, (Titrant)	6.03001.210
OMNIS 50 mL cylinder unit, 2x (Solvent)	6.03001.250
OMNIS Stand-alone license (including one instrument license)	6.06003.010
OMNIS instrument license, 1x	6.06002.010
Pt Titrode	6.0431.100

Ag/AgCl Reference Electrode	6.0729.100
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Solutions

Titrant TAN	KOH in IPA; c(KOH) = 0.1 mol/L
Solvent TAN	5000 mL toluene, 4950 mL IPA, 50 mL water CO ₂ free
Titrant TBN	HClO ₄ in acetic acid, c(HClO ₄) = 0.1 mol/L
Solvent TBN	6000 mL toluene, 3000 mL acetic acid, 1000 mL acetone

Parameters

Method	TAN	TBN
Mode	MET U	MET U
Start volume	0 mL	0 mL
Pause	60 s	60 s
Signal drift	10 mV/min	10 mV/min
Min. waiting time	0	0
Max. waiting time	60 s	60 s
Volume increment	0.1 mL	0.2 mL
Stop volume	10 mL	10 mL
Stop EP	Off	Off
Volume after EP	-	-
EP criterion	30	30
EP recognition	Greatest*1	Last

Results

Used motor oil

Result	TAN	TBN
mg KOH/g	1.321	7.5425
RSD %	3.05 (n = 11)	1.10 (n = 14)

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