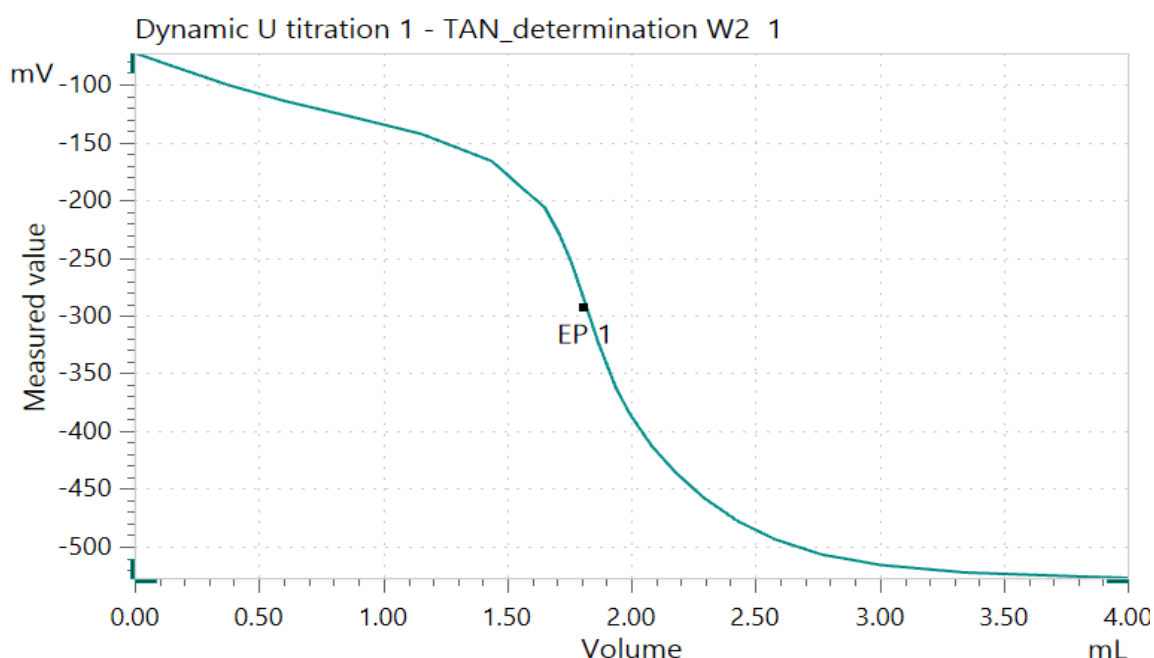


Determination of the acid number according to ASTM D664, and IP 177 and the base number according to ISO 3771 in fresh motor oil



The acid number (AN) and base number (BN) are crucial parameters in the quality control and validation of refined petroleum products. This Application Note describes the potentiometric determination of the AN according to ASTM D664 and IP 177 with a reduced solvent volume of 60 mL as well as the BN according to ISO 3771 using a fully automated OMNIS system. For the indication a dSolvtrode was used.

Method description

Sample

New motor oil

Configuration

Main module Pick&Place S	2.1010.0010
"Peristaltic" (4-channel) pump module	2.1016.0110
"Peristaltic" (2-channel) pump module – accessory set	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), 2x	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
Digital measuring module, 2x	6.02100.010
Electrode cable plug-in head Q / plug P, 1.5 m, 2x	6.02104.310
OMNIS 20 mL cylinder unit, 2x,	6.03001.210
OMNIS 50 mL cylinder unit, 2x	6.03001.250
OMNIS Stand-alone license (including one instrument license)	6.06003.010
OMNIS instrument license, 1x	6.06002.010
dSolvotrode, 2x	6.00203.300

Solutions

Titration TAN	TBAOH in MeOH; c(TBAOH) = 0.1 mol/L
Solvent TAN	5000 mL toluene, 4950 mL IPA, 50 mL CO ₂ free water
Titration 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

Analysis

4 – 7 g sample is accurately weighted into a sample beaker. 60 mL solvent is automatically added. The sample is then titrated until after the equivalence point 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.

Parameters

Method	TAN	TBN
Mode	DET U	DET U
Pause	60 s	60 s
Signal drift	10 mV/min	10 mV/min
Min. waiting time	5	5
Max. waiting time	60 s	60 s
MPD	4	4
Min vol. increment	50 µL	50 µL
Max vol. increment	500 µL	500 µL
Stop volume	4 mL	4 mL
Stop EP	Off	Off
Volume after EP	-	-
EP criterion	30	30
EP recognition	Greatest	Greatest

Results

New motor oil sample

Result	TAN	TBN
mg KOH/g	1.917	7.233
RSD %	1.78 (n = 28)	1.01 (n = 26)

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