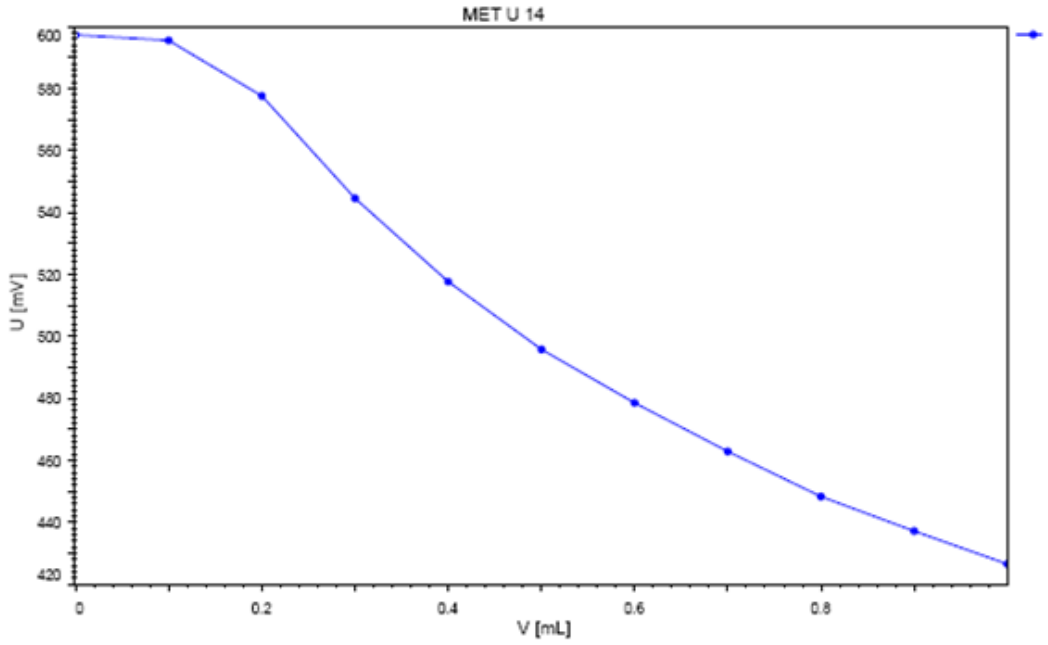
Titration Application Note T-093

Total base number in used engine oil

Fully automatic photometric determination increases reliability of results



Basic additives are added to petroleum products to inhibit corrosion as they have a neutralizing effect on acidic compounds, which are formed as a result of degradation processes. Total base number (TBN) indicates the amount of basic additives present and thus can be used as a measure for the degradation of the petroleum product.

Using an automated titration system with a photometric sensor to detect the end point ensures that the titrations are always carried out under the same conditions. This improves the precision and reliability of the results.

This Application Notes describes the fully automated photometric determination of TBN in used engine oil using the Metrohm Optrode for the indication of the methyl orange endpoint (at 520 nm).

Metrohm

Method description

Sample

Used engine oil

Sample preparation

Degas with nitrogen or under vacuum for 60 s.

Configuration

907 Titrando	2.907.0010
800 Dosino, 2x	2.800.0010
Dosing unit 10 mL	6.3032.210
Dosing unit 50 mL	6.3032.250
802 Rod Stirrer	2.802.0020
815 Robotic USB SP	2.815.0110
Sample beaker 250 mL	6.1432.320
Sample rack 28 x 250 mL	6.2041.820
Optrode (at 520 nm)	6.1115.000

Solutions

Titrant	c(HCl) = 0.1 mol/L in 2-propanol
Indicator	methyl orange indicator (CAS 547-58-0) Dissolve 0.1 g of methyl orange in 100 mL of water.
Solvent mixture	500 mL toluene and 495 mL 2-propanol and 5 mL dist. water

Analysis

Weigh an appropriate amount sample into the sample beaker and add 80 mL solvent solution. Degas with nitrogen or under vacuum for 60 s.

After blank titration, titrate with 0.1 mol/L HCL using the MET mode and the Optrode (520 nm).

Parameters

Titration mode	MET
Measurement drift	50 mV/min
Min. waiting time	0 s
Max. waiting time	26 s
Volume increment	0.1 mL
EP criterion	30 mV
EP recognition	greatest
Stirring speed	8

Results

TBN in mg KOH/g	
1.026 ± 0.008 (n = 3)	

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