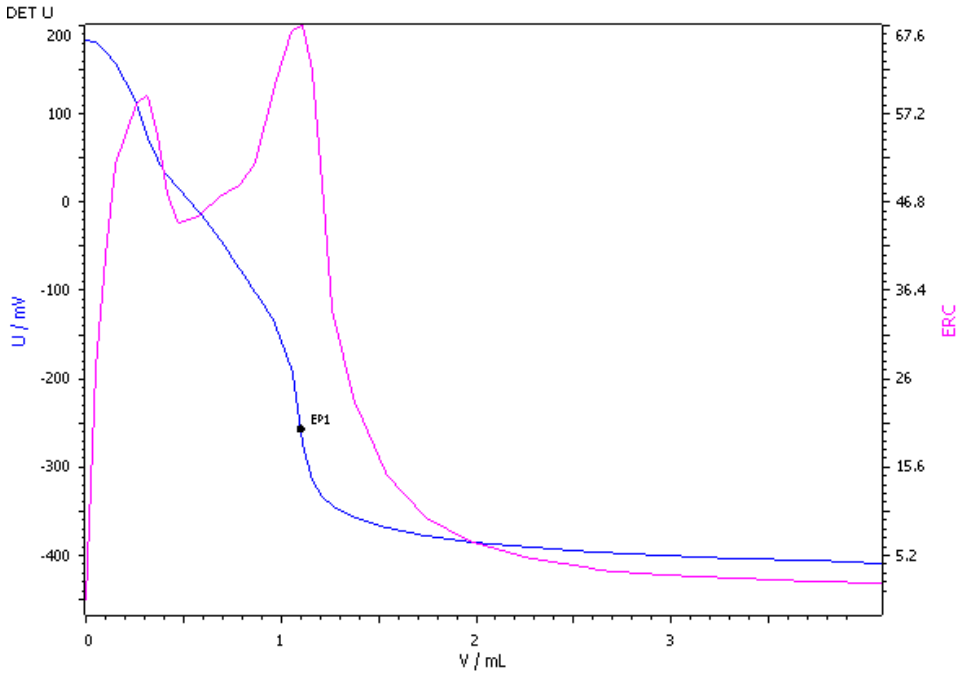
Titration Application Note T-096

Acid number in lubricating oil

Determination according to ASTM D664 and IP 177



Fresh and used petroleum products may contain acidic constituents as additives or degradation products. Acid number (AN) is a measure for the relative amount of acids present express as mg KOH per g sample. Moreover, AN is used as a quality parameter of lubricating oils both for assessing the quality of new formulations and as an indicator for the degradation of such formulations during service.

The use of a pH electrode suitable for non-aqueous titrations ensures the reliable determination of the equivalence point. A flexible sleeve diaphragm facilitates the cleaning of the sensor especially after use in heavily contaminated samples, such a used engine oils. Using the right sensor greatly increases the precision and reliability of the results.

This Application Note describes the potentiometric determination of AN according to ASTM D664 and IP 177 using the Solvotrode easyClean sensor.

Metrohm

Method description

Sample

Lubricating oil

Sample preparation

No sample preparation is required.

Configuration

907 Titrando	2.907.0010
800 Dosino, 2×	2.800.0010
Dosing unit 10 mL	6.3032.210
Dosing unit 50 mL	6.3032.250
804 Ti-Stand	2.804.0010
802 Stirrer	2.802.0020
Solvotrode easyClean	6.0229.010

Solutions

Titrant	c(KOH) = 0.1 mol/L in 2-propanol (IPA). If possible this solution should be bought from a supplier
Solvent	Φ(toluene) = 50%, Φ(2-propanol) = 49.5% and Φ(CO_2-free H_2O) = 0.5%

Analysis

A blank titration is performed using 60 or 125 mL solvent and standardized c(KOH in IPA) = 0.1 mol/L as titrant.

An appropriate amount of well-mixed sample is weighed into the titration vessel and 60 or 125 mL solvent are added. After dissolution, the sample is titrated with standardized c(KOH in IPA) = 0.1 mol/L until after the equivalence point.

After the titration, the electrode and burette tips are rinsed: first with the solvent mixture, then with IPA, and finally with deionized H_2O. In order to rehydrate the membrane of the electrode, the membrane only is placed for 3 to 5 min in dist. H_2O. Before the next measurement, the electrode is rinsed with 2-propanol.

Parameters

Mode	DET U
Stirrer speed	8
Meas. point density	4
Min. increment*	50 µL
Max. increment *	500 µL
Signal drift	60 mV/min
Max. waiting time	60 s
Stop EP	off
EP criterion	5
EP recognition	last

* For the blank determination, a min. increment of 10 µL and a max. increment of 50 µL is taken.

Results

	TAN/ (mg KOH / g sample)
Mean (n = 3)	1.0881
s(rel)	0.47%

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