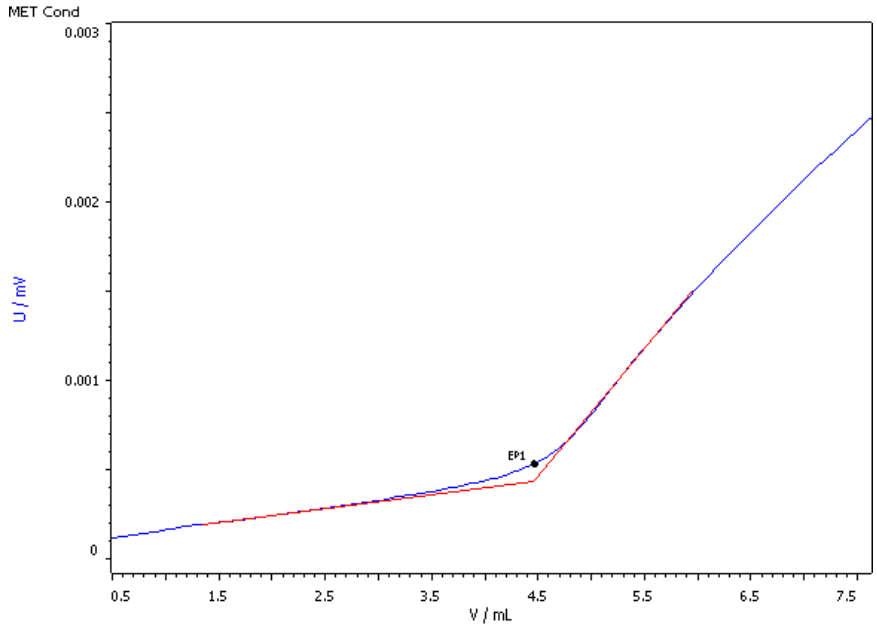
Titration Application Note T-098

Conductometric determination of TBN in petroleum products according to IP 400



This Application Note describes the conductometric determination of the total base number according to IP 400. The investigated sample is hydraulic oil.

Metrohm

Method description

Sample

Hydraulic oil

Sample preparation

No sample preparation required

Configuration

856 Conductivity module	2.856.0220
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 Rod Stirrer	2.802.0020
Conductivity cell, c = 0.1 cm^{-1}	6.0916.040

Solutions

Titrant	c(HCl) = 0.1 mol/L in 2-propanol. 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

An appropriate amount of well-mixed sample is weighed into the titration vessel and 75 mL solvent are added. Proceed with the titration using standardized c(HCl) = 0.1 mol/L.

After the titration, the burette tip and conductivity measuring cell are rinsed with solvent until no more oil is visible. The conductivity measuring cell is then rinsed with dist. H_2O followed by solvent.

Parameters

Mode	MET Cond
Stirrer speed	8
Pause	30 s
Signal drift	off
Min. waiting time	10 s
Max. waiting time	10 s
Volume increment	0.1 mL

Calculations

$$TBN = \frac{(V_{last\ EP} - V_{blank}) \times c_{HCl} \times f \times M_A}{m_s}$$

TBN	Total acid number in mg KOH/g sample
$V_{last\ EP}$:	Titrant consumption in mL to reach the last equivalence point.
V_{blank}:	Blank value consumption for the used quantity of solvent
c_{HCl}:	Concentration of titrant in mol/L; here c(HCl) = 0.1 mol/L
f:	Correction factor (titer), dimensionless
M_A:	Molar mass of KOH; 56.106 g/mol
m_s:	Sample size in g

Results

	Sample size/(g)	TBN/ (mg KOH/g sample)
1	3.0378	8.206
2	3.0336	8.256
3	3.0181	8.219
4	3.0088	8.193
5	3.0124	8.198
6	3.0024	8.197
Mean		8.212
s(rel)		0.29%