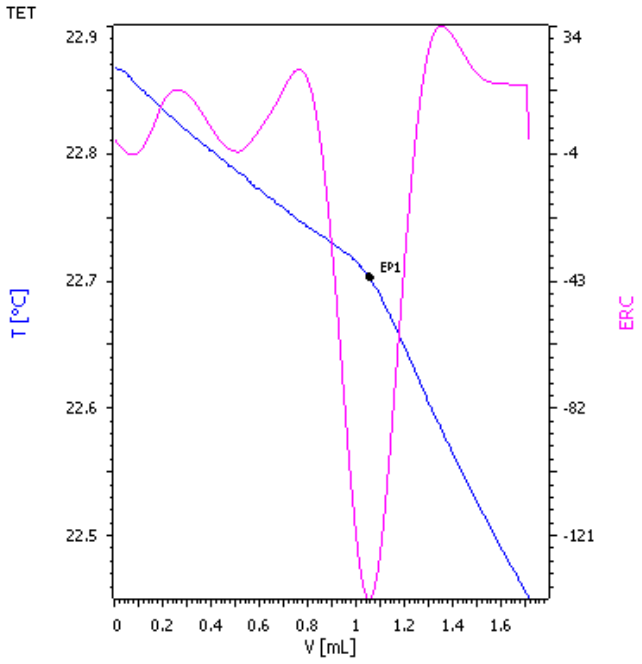
Titration Application Note H–141

Determination of the acid number in crude oil and gas oil as per ASTM D8045



The reliable knowledge of the accurate acid number for crude oil is important for the determination of the price of crude oi. Additionally, by monitoring the acidity of crude oil and the associated process oils unexpected shutdowns can be prevented and thus expensive treatment chemicals preserved. The determination of the acid number in crude oil and various gas oil samples by catalytic thermometric titration is described here.

Metrohm

Method description

Samples

- Desalted Crude
- Raw Crude
- Vacuum Light Gas Oil
- Vacuum Heavy Gas Oil
- Atmospheric Heavy Gas Oil
- 650 Endpoint Gas Oil

Sample preparation

Usually no sample preparation is needed. However, some samples may require slight warming or pre-dissolution in 10 mL of isomeric xylene prior to titration. It is possible to titrate warm samples (<60 °C) without a loss of resolution or precision.

Configuration

859 Titrotherm including: 1x 800 Dosino 1x 802 Rod stirrer 1x 804 Ti-Stand 1x 10 mL Dosing unit 1x Thermoprobe	2.859.1010
800 Dosino	2.800.0010
50 mL Dosing Unit	6.3032.250

Reagents

Titrant	c(KOH) = 0.1 mol/L in IPA If possible this solution should be bought from a supplier.
Solvent	250 mL isopropanol and 750 mL isomeric xylene are mixed in a volumetric flask.
Paraformaldehyde	>95% pure, Sigma-Aldrich, 158127

Analysis

Blank determination

A linear regression of different sample sizes against titrant-consumption is performed. 3 – 9 g sample is weighed into the titration vessel and 30 mL solvent as well as 0.5 g paraformaldehyde are added. The solution is stirred thoroughly for 30 s before the titration with c(KOH) = 0.1 mol/L to a single exothermic endpoint is started.

Sample determination

3 – 9 g sample is weighed into the titration vessel and 30 mL solvent and 0.5 g paraformaldehyde are added. The solution is stirred thoroughly for 30 s before the titration with c(KOH) = 0.1 mol/L to a single exothermic endpoint is started.

Parameters

Pause	30 s
Stirrer rate	15
Dosing rate	2 mL/min
Filter factor	50 – 75*
Damping until	0.2 mL
Stop slope	Off
Stop volume	2.5 mL
Added volume after stop	0.5 mL
Evaluation start	0 mL
End points	Ex (exothermic)
EP criterion	-50

* The filter factor depends on the sample and thus may vary. It is important that the same filter factor is used for the blank and sample determination.

Results

TAN in mg KOH / g sample (n = 8)

Sample	TAN / (mg KOH / g sample)	s(rel) / %
Desalted Crude	0.76	2.1
Raw Crude	0.73	1.1
Vacuum Light Gas	1.23	0.0
Vacuum Heavy Gas	1.25	0.8
Atmosph. Heavy Gas	1.15	1.2
650 Endpoint Gas	0.73	1.1