Total base number – TBN according to ASTM D2896/ISO 3771

Application

Use

Determination of basic constituents in petroleum products by potentiometric titration with perchloric acid in glacial acetic acid. The total base number (TBN) is the quantity of perchloric acid, expressed in terms of equivalent number of milligrams of potassium hydroxide (or alternatively in milli-equivalents of hydroxide per gram), that is required to neutralize all basic constituents present in 1 g of sample when titrated under the prescribed conditions.

Appliances

Titrator:	TitroLine 7000 with 10 ml unit
Magnetic stirrer:	TM 235
Titration tip:	TZ 1643
other appliances:	printer/USB memory stick or software TitriSoft

Electrodes

Electrode:	N 6480 eth
Electrolyte:	LiCl/ethanol, L 503 4

Reagents

Solvent:	glacial acetic acid/chlorobenzene (1/2)
Standardization:	with Potassium hydrogen phthalate (KHC_8H4O_4) or “Tris”
Titrant:	Perchloric acid 0.1 mol/L in glacial acetic acid

Description

Blank value of the solvent mixture

Add 120 mL of the titration solvent into the beaker. Place the beaker on the magnetic stirrer and start the titration method. After titration rinse the electrode and burette tip with solvent, then with water, then again with solvent in a beaker for appr. 1 minute. Use method: **BLANK_TBN**

Repeat the blank titration one time. The average value can be stored in a global memory e.g. M01 (TBN blank) which have to create before.

Preparation of the Perchloric acid solution

Please use a “ready to use” titration solution 0.1 mol/L.

Standardization

With dried Potassium hydrogen phthalate (120 °C). Take 0.15 to 0.2 g of the potassium hydrogen phthalate or Tris weighed to the nearest 0.1 mg and dissolve it in 40 ml acetic acid under heating. Add 80 ml Chlorobenzene. Use method -> **Titer perchloric acid**

Repeat the standardization two times. The average value is stored automatically in the exchangeable unit.

Titration

Calculate the quantity of the sample required from expected total base number (TBN) from the equation:

Approximate mass, in gram, of sample = 28/expected TBN

Weigh the sample in a 250 mL beaker and add 120 ml of the titration solvent to the sample. Place the beaker on the magnetic stirrer and start the titration method. After titration rinse the electrode and burette tip with solvent, then with water, then again with solvent in a beaker for appr. 1 minute. Use method **TBN ISO ASTM**

Maintenance of Electrodes

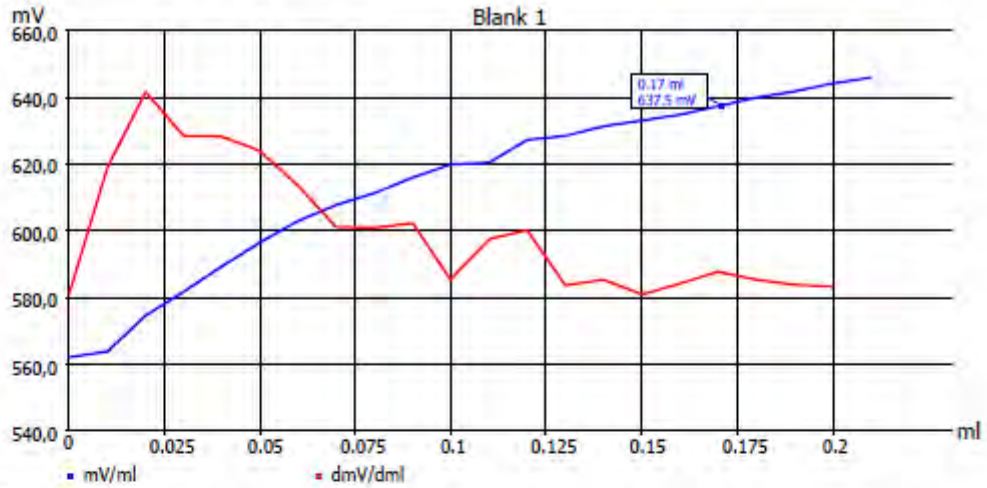
If you use a combination electrode such as N 6480 store the electrode in the LiCl/glacial acid electrolyte.

Result

blank value (page 1): Note: The blank value here is manually set to 0.02 ml. The found EQ is too high and wrong.

GLP documentation

Titration graph



Method data

Method name:	Blank TBN	Titration duration:	3 m 42 s
End date:	08.11.12	End time:	12:52:26

Titration data

Sample ID:	Blank 1		
Start mV:	560.9 mV	End mV:	645.8 mV
EQ:	0.171 ml / 637.5 mV	Blank:	0.171 ml
Mean value:	---		

Calculation formula

Blank:	EQ1 -> M01
Mol (M):	1.00000
Statistics:	2

Device information

Device:	TitroLine 7000
Serial number:	00012
Software version:	1230k

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blank value (page 2):

Method data overall view

Method name:	Blank TBN	Created at:	11/08/12 12:40:17
Method type:	Automatic titration	Last modification:	11/08/12 12:47:13
Measured value:	mV	Damping settings:	strong
Titration mode:	Linear	Documentation:	GLP
Linear steps:	0.010 ml		
Measuring speed / drift:	10 s		
Initial waiting time:	10 s		
Titration direction:	Increase		
Pretitration:	Off		
End value:	Off		
EQ:	On (1)		
Slope value:	Flat	Value:	120

Dosing parameter

Dosing speed:	100 %	Filling speed:	30 s
Maximum dosing volume:	0.30 ml		

Unit values

Unit size:	20ml
Unit ID:	10039168
Reagent:	HClO4 0.1 mol/L
Batch ID:	no entry
Concentration [mol/l]:	0.10000
Determined at:	11/08/12 20:16:03
Expire date:	--
Opened/compounded:	--
Test according ISO 8655:	05/03/12
Last modification:	11/08/12 12:16:04

Device information

Device:	TitroLine 7000
Serial number:	00012
Software version:	1230k

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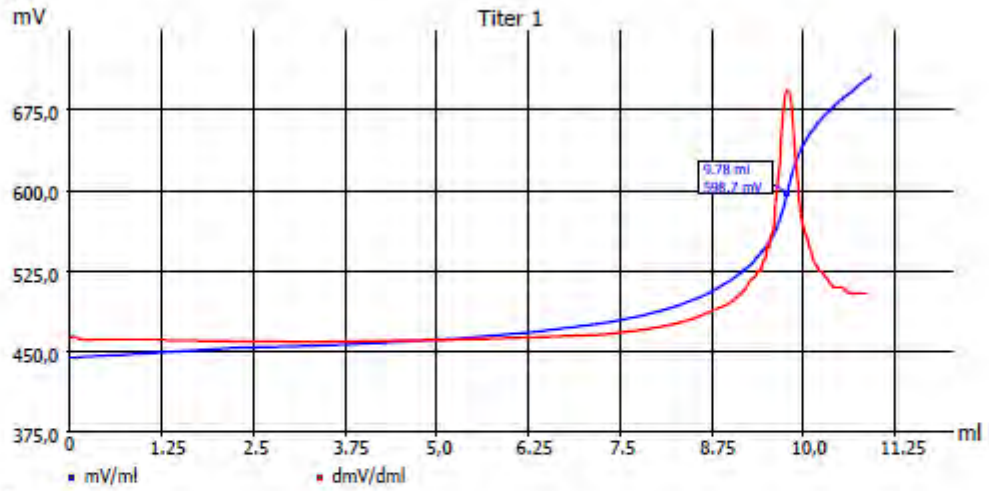
Standardization (page 1):

GLP documentation

Titration graph



Method data

Method name:	Titer Perchloric acid	Titration duration:	5 m 49 s
End date:	08.11.12	End time:	14:16:28

Titration data

Sample ID:	Titer 1	Weight:	0.2022 g
Start mV:	443.8 mV	End mV:	707.5 mV
EQ:	9.779 ml / 598.7 mV	Titer:	0.1015 mol/l
Mean value:	---	RSD:	---

Calculation formula

Titer:	(W*F2)/((EQ1-B)*M*F1) -> M103
Mol (M):	204.22000

Weight (W):	man	Factor 2 (F2):	1000.0000
Blank value (B):	0.0200 ml (M01)	Factor 1 (F1):	1.0000
Statistics:	3		

Device information

Device:	TitroLine 7000
Serial number:	00012
Software version:	1230k

Titer_Perchloric_acid_08_11_12-14_10_38.pdf 1/2

Standardisation (page 2):

Method data overall view

Method name:	Titer Perchloric acid	Created at:	11/08/12 12:22:19
Method type:	Automatic titration	Last modification:	11/08/12 14:07:34
Measured value:	mV	Damping settings:	average
Titration mode:	Dynamic	Documentation:	GLP
Dynamic:	average		
Measuring speed / drift:	Normal:	minimum holding time:	03 s
		maximum holding time:	15 s
		Measuring time:	02 s
		Drift:	10 mV/min
Initial waiting time:	0 s		
Titration direction:	Increase		
Pretitration:	Off		
End value:	Off		
EQ:	On (1)		
Slope value:	User-defined	Value:	350

Dosing parameter

Dosing speed:	100 %	Filling speed:	30 s
Maximum dosing volume:	15.00 ml		

Unit values

Unit size:	20ml
Unit ID:	10039168
Reagent:	HClO4 0.1 mol/L
Batch ID:	no entry
Concentration [mol/l]:	0.10000
Determined at:	11/08/12 20:16:03
Expire date:	--
Opened/compounded:	--
Test according ISO 8655:	05/03/12
Last modification:	11/08/12 12:16:04

Device information

Device:	TitroLine 7000
Serial number:	00012
Software version:	1230k

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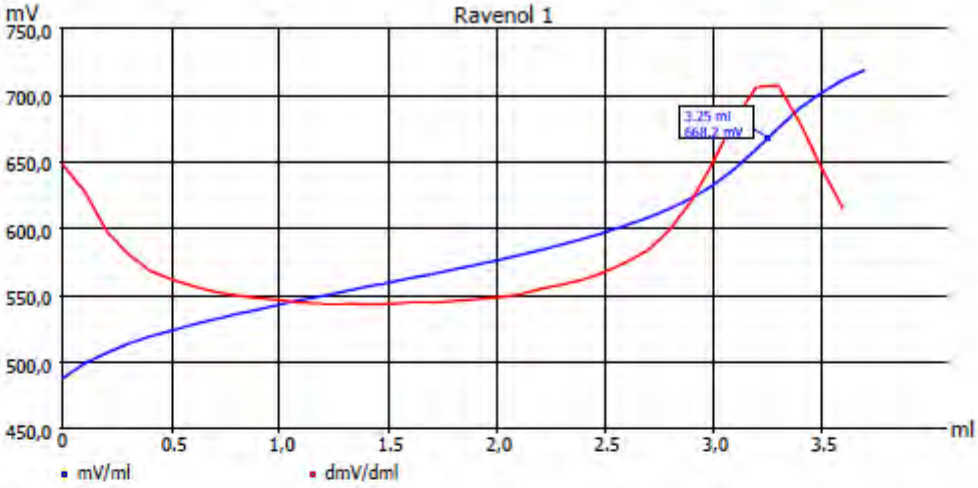
sample titration (page 1):

GLP documentation

Titration graph



Method data

Method name:	TBN ISO 3771	Titration duration:	4 m 46 s
End date:	08.11.12	End time:	14:24:44

Titration data

Sample ID:	Ravenol 1	Weight:	1.5102 g
Start mV:	486.8 mV	End mV:	718.8 mV
EQ:	3.255 ml / 668.2 mV	TBN mg KOH/g:	12.197

Calculation formula

TBN mg KOH/g:	(EQ1-B)*T*M*F1/(W*F2)
Mol (M):	56.10000

Blank value (B):	0.0200 ml (M01)	Titre (T):	0.10150000 (a)
Factor 1 (F1):	1.0000	Weight (W):	man
Factor 2 (F2):	1.0000	Statistics:	Off

Device information

Device: TitroLine 7000
Serial number: 00012
Software version: 1230k

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sample titration (page 2):

Method data overall view

Method name:	TBN ISO 3771	Created at:	11/08/12 14:17:55
Method type:	Automatic titration	Last modification:	11/08/12 14:18:45
Measured value:	mV	Damping settings:	strong
Titration mode:	Linear	Documentation:	GLP
Linear steps:	0.100 ml		
Measuring speed / drift:	User-defined:	minimum holding time:	07 s
		maximum holding time:	20 s
		Measuring time:	04 s
		Drift:	10 mV/min
Initial waiting time:	10 s		
Titration direction:	Increase		
Pretitration:	Off		
End value:	Off		
EQ:	On (1)		
Slope value:	Flat	Value:	120

Dosing parameter

Dosing speed:	100 %	Filling speed:	30 s
Maximum dosing volume:	6.00 ml		

Unit values

Unit size:	20ml
Unit ID:	10039168
Reagent:	HClO4 0.1 mol/L
Batch ID:	no entry
Concentration [mol/l]:	0.10150
Determined at:	11/08/12 20:16:03
Expire date:	--
Opened/compounded:	--
Test according ISO 8655:	05/03/12
Last modification:	11/08/12 14:16:29

Device information

Device:	TitroLine 7000
Serial number:	00012
Software version:	1230k

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Hints

If you have any questions concerning the application, you are welcome to contact us.

Literature

International Standard ISO 3771 or ASTM 2896.

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