

**Total acid number  
number - TAN**



# Application

## Use

Determination of acidic constituents in petroleum products and lubricants by potentiometric titration. The total acid number **TAN** is the quantity of base, expressed in milligrams of potassium hydroxide, that is required to neutralize all acidic constituents present in 1 g of sample.

## Appliances

Titration:	TitroLine® 7000 or TL 7750 with 5 or 10 ml unit
Magnetic stirrer:	TM 235
other appliances:	printer/USB memory stick or Titrisoft

## Electrodes

Electrode:	N 6480 (filled with LiCl/Ethanol )
Electrolyte:	LiCl/Ethanol, L 503 4

## Reagents

Solvent:	toluene/isopropyl alcohol/water (500/495/5)
Titration agent:	KOH 0,1 mol/L in isoprop.
Standardisation:	with potassium hydrogen phthalate standard

## Description

### Preparation and standardization of the alcoholic KOH solution

Add 6 g of KOH to approximately 1 L of anhydrous isopropyl alcohol. Boil gently for 10 min to effect solution. Allow the solution to stand for 2 days and then filter through a fine sentered-glass funnel. Store the solution in a chemical resistant bottle and protect the solution for CO<sub>2</sub> with a guard tube containing soda lime. Standardize with exact weighed quantities of 0.2 g of potassium hydrogen phthalate. Add 80 ml CO<sub>2</sub> free water. Ready to use solutions are recommended. Use the method Titer KOH.

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

# Application

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## Blank value of the solvent mixture

Add 125 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 TAN**

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

## Titration

Weigh the sample in a 250 mL beaker and add 125 mL of the titration solution to the sample. The sample weight should be calculated and selected that the titration amount is not more than 4 ml because of the long titration time.

Place the beaker on the magnetic stirrer and start the titration method (TAN). After the titration rinse the electrode and burette tip with solvent, then with water (5 min), then again with solvent.

## Maintenance of Electrodes

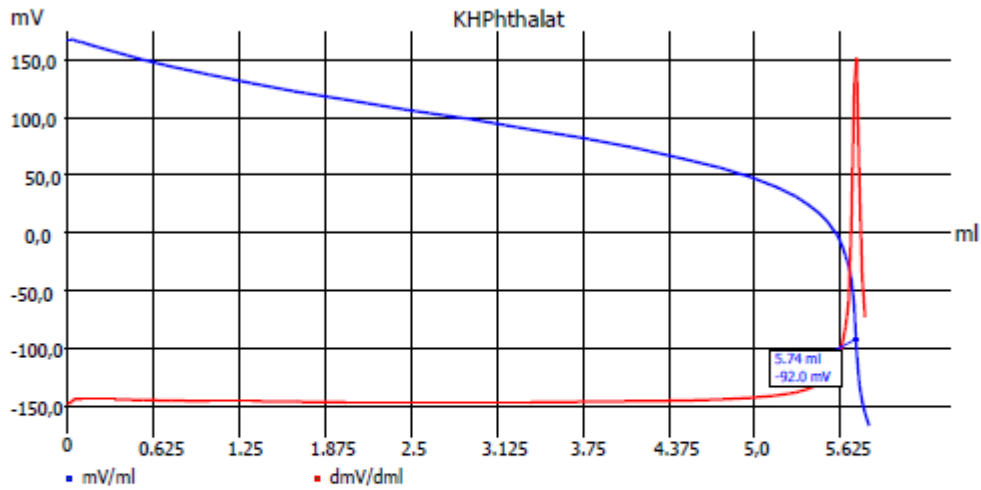
If you use a combination electrode like N 6480 store the electrode in the LiCl/Ethanol electrolyte.

# Application

standardisation (page 1):

## GLP documentation

### Titration graph



### Method data

Method name:	Titer KOH	Titration duration:	3 m 31 s
End date:	21.09.12	End time:	15:13:54

### Titration data

Sample ID:	KHPthalat	Weight:	0.1209 g
Start mV:	167.9 mV	End mV:	-167.2 mV
EQ:	5.739 ml / -92.0 mV	Titer:	0.1032 mol/l

### Calculation formula

Titer:  $(W \cdot F2) / ((EQ1 - B) \cdot M \cdot F1) \rightarrow M103$   
 Mol (M): 204.22000

Weight (W):	man	Factor 2 (F2):	1000.0000
Blank value (B):	0.0000 ml	Factor 1 (F1):	1.0000
Statistics:	Off		

### Device information

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

Titer\_KOH\_21\_09\_12-15\_10\_23.pdf

1/2

# Application

standardisation (page 2):

## Method data overall view

Method name:	Titer KOH	Created at:	09/19/12 17:05:06
Method type:	Automatic titration	Last modification:	09/19/12 17:32:02
Measured value:	mV	Damping settings:	None
Titration mode:	Dynamic	Documentation:	GLP
Dynamic:	Steep		
Measuring speed / drift:	Normal:	minimum holding time:	02 s
		maximum holding time:	15 s
		Measuring time:	02 s
		Drift:	20 mV/min
Initial waiting time:	0 s		
Titration direction:	Decrease		
Pretitration:	Off		
End value:	Off		
EQ:	On (1)		
Slope value:	Steep	Value:	700

## Dosing parameter

Dosing speed:	100 %	Filling speed:	30 s
Maximum dosing volume:	50.00 ml		

## Unit values

Unit size:	10ml
Unit ID:	00072696
Reagent:	TBA Hydroxid
Batch ID:	1.0265
Concentration [mol/l]:	0.10365
Determined at:	09/20/12 0:57:27
Expire date:	04/12/12
Opened/compounded:	10/19/11
Test according ISO 8655:	12/01/10
Last modification:	09/21/12 15:06:50

## Device information

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

Titer\_KOH\_21\_09\_12-15\_10\_23.pdf

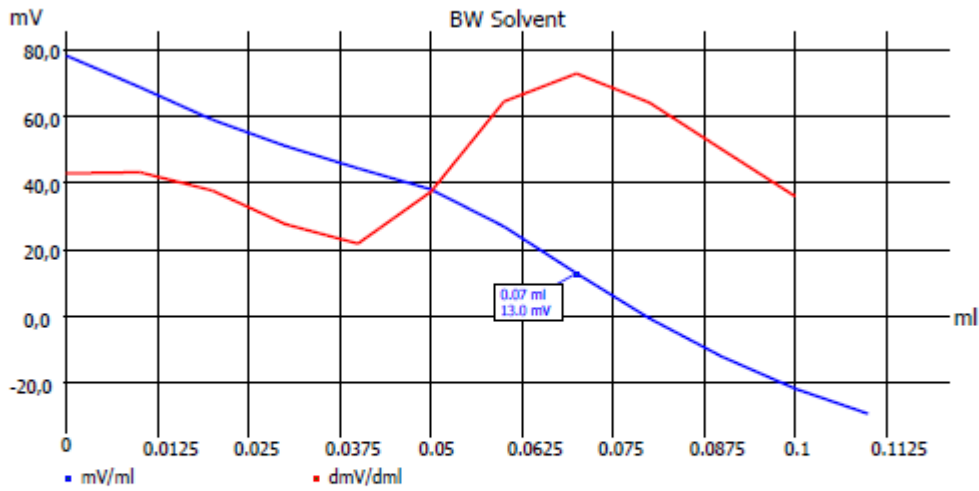
2/2

# Application

blank value (page 1):

## GLP documentation

### Titration graph



### Method data

Method name:	Blank TAN-TBN	Titration duration:	3 m 1 s
End date:	21.09.12	End time:	16:27:20

### Titration data

Sample ID:	BW Solvent		
Start mV:	82.7 mV	End mV:	-29.1 mV

EQ:	0.070 ml / 13.0 mV	Blank:	0.070 ml
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### Calculation formula

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

Statistics: Off

### Device information

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

Blank\_TAN-TBN\_21\_09\_12-16\_24\_19.pdf

1/2

# Application

blank value (page 2):

## Method data overall view

Method name:	Blank TAN-TBN	Created at:	09/21/12 15:29:51
Method type:	Automatic titration	Last modification:	09/21/12 16:22:36
Measured value:	mV	Damping settings:	strong
Titration mode:	Linear	Documentation:	GLP
Linear steps:	0.010 ml		

Measuring speed / drift: 15 s

Initial waiting time:	10 s		
Titration direction:	Decrease		
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:	0.20 ml		

## Unit values

Unit size:	10ml
Unit ID:	00072696
Reagent:	TBA Hydroxid
Batch ID:	1.0265
Concentration [mol/l]:	0.10350
Determined at:	09/21/12 22:27:50
Expire date:	04/12/12
Opened/compounded:	10/19/11
Test according ISO 8655:	12/01/10
Last modification:	09/21/12 15:28:02

## Device information

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

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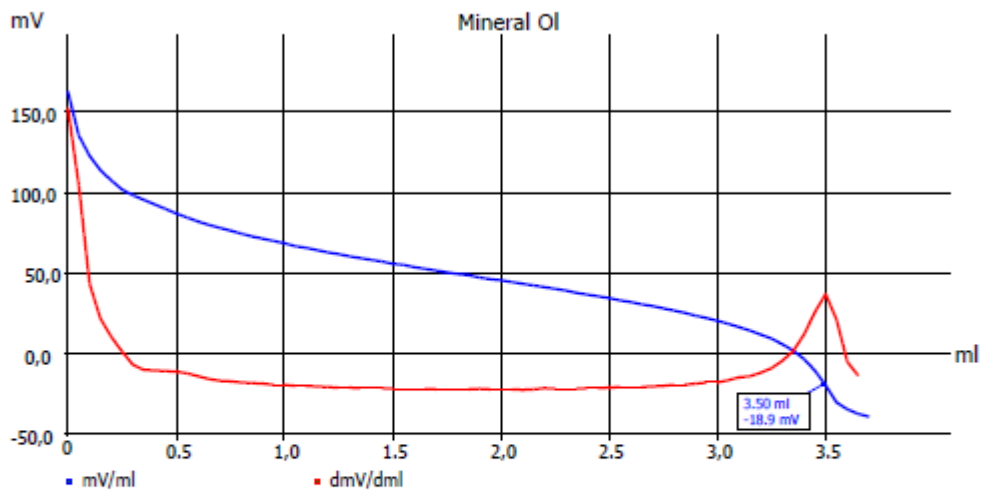
2/2

# Application

sample titration (page 1): example with high or normal TAN value > 1

## GLP documentation

### Titration graph



### Method data

Method name:	TAN ASTM 664	Titration duration:	10 m 9 s
End date:	21.09.12	End time:	16:48:29

### Titration data

Sample ID:	Mineral Oil	Weight:	4.0225 g
Start mV:	161.9 mV	End mV:	-39.4 mV

EQ:	3.496 ml / -18.9 mV	TAN mg KOH/g:	4.95
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### Calculation formula

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

Blank value (B):	0.0700 ml (M01)	Titre (T):	0.10350000 (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: 1230

TAN\_ASTM\_664\_21\_09\_12-16\_38\_19.pdf

1/2



# Application

sample titration (page 2):

## Method data overall view

Method name:	TAN ASTM 664	Created at:	09/19/12 16:27:55
Method type:	Automatic titration	Last modification:	09/21/12 16:31:53
Measured value:	mV	Damping settings:	strong
Titration mode:	Linear	Documentation:	GLP
Linear steps:	0.050 ml		

Measuring speed / drift:	User-defined:	minimum holding time:	07 s
		maximum holding time:	20 s
		Measuring time:	04 s
		Drift:	20 mV/min
Initial waiting time:	10 s		
Titration direction:	Decrease		
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:	5.00 ml		

## Unit values

Unit size:	10ml
Unit ID:	00072696
Reagent:	TBA Hydroxid
Batch ID:	1.0265
Concentration [mol/l]:	0.10350
Determined at:	09/21/12 22:27:50
Expire date:	04/12/12
Opened/compounded:	10/19/11
Test according ISO 8655:	12/01/10
Last modification:	09/21/12 15:28:02

## Device information

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

TAN\_ASTM\_664\_21\_09\_12-16\_38\_19.pdf

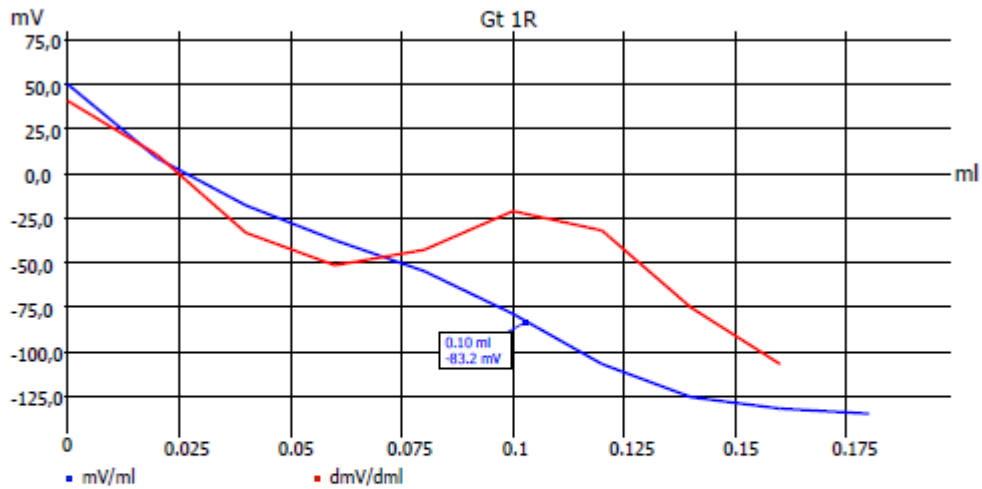
2/2

# Application

sample titration (page 1): example with low TAN value < 1

## GLP documentation

### Titration graph



### Method data

Method name:	TAN ASTM 664	Titration duration:	2 m 49 s
End date:	12.10.12	End time:	10:01:49

### Titration data

Sample ID:	Gt 1R	Weight:	19.1539 g
Start mV:	49.6 mV	End mV:	-135.0 mV
EQ:	0.103 ml / -83.2 mV	TAN mg KOH/g:	0.009

### Calculation formula

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

Blank value (B):	0.0740 ml (M01)	Titre (T):	0.10580000 (a)
Factor 1 (F1):	1.0000	Weight (W):	man
Factor 2 (F2):	1.0000	Statistics:	Off

### Device information

Device: TitroLine 7000  
 Serial number: 10010889  
 Software version: 1230

TAN\_ASTM\_664\_12\_10\_12-09\_58\_59.pdf

1/2

# Application

sample titration (page 2): example with low TAN value < 1

## Method data overall view

Method name:	TAN ASTM 664	Created at:	10/12/12 9:56:06
Method type:	Automatic titration	Last modification:	10/12/12 9:58:13
Measured value:	mV	Damping settings:	strong
Titration mode:	Linear	Documentation:	GLP
Linear steps:	0.020 ml		

Measuring speed / drift:	User-defined:	minimum holding time:	07 s
		maximum holding time:	20 s
		Measuring time:	04 s
		Drift:	20 mV/min
Initial waiting time:	10 s		
Titration direction:	Decrease		
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:	1.00 ml		

## Unit values

Unit size:	10ml
Unit ID:	10035468
Reagent:	KOH 0.1 mol/L
Batch ID:	no entry
Concentration [mol/l]:	0.10580
Determined at:	10/12/12 16:16:25
Expire date:	--
Opened/compounded:	--
Test according ISO 8655:	--
Last modification:	10/12/12 9:44:44

## Device information

Device:	TitroLine 7000
Serial number:	10010889
Software version:	1230

TAN\_ASTM\_664\_12\_10\_12-09\_58\_59.pdf

2/2

# Application

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## Hints

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

## Literature

ASTM 664

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