

<i>Category</i>	<i>AUTOMATIC TITRATOR COM Series</i>
Petroleum Products Biofuel	Total Acid Number (TAN) by Potentiometric titration method (non-aqueous)
Referenced methods	ASTM D664, JIS K2501, EN 14104, ISO 6619

Key words; Petroleum products, lubricants, bio diesel, total acid number, non-aqueous acid/base titration

Outline

The total acid number (TAN) is one of the important indices for evaluating the quality of petroleum products and lubricants. The acid number is expressed as milligrams (mg) of potassium hydroxide (KOH) required to neutralize the total acidic components contained in 1g of sample, consisting of organic and inorganic acids, esters, phenolic compounds, lactones, resins, salt of heavy metals, and additives such as antioxidants and detergents. Test methods for TAN determination are mainly classified into two; the color indicator titration methods (p-naphthol benzene indicator) and the potentiometric titration method.

This section introduces an example in which the total acid value of diesel engine oil (used) was measured by potentiometric titration method. This method can be utilized regardless of the color of the samples.

Precaution

In this method, the sample volume corresponding to total acid value is weighed precisely to be added and dissolved in a mixture of toluene and propan-2-ol. Electrodes are then immersed for titration with 2-propanol-type potassium hydroxide titrant. For samples, which have well-defined inflection points, end points are taken only at well-defined inflections. When no definite inflections are obtained, the pH indicated by non-aqueous basic buffer is considered as the end point for samples with unclear inflection points.

Reagents

- Titrant* : 0.1mol/L potassium hydroxide solution (in 2-propanol)
- Titration solvent* : Toluene 500mL
2-propanol 495mL
DI Water 5mL } 1L...125mL per measurement
- Buffer* : Commercial aqueous buffer solution

Instruments & Electrodes

Recommended automatic titrator **COM-1700S / COM-1600S / COM-300A**

- **GE-101B** Glass electrode
 - **RE-201** Reference electrode
- } standard accessories
- (Replace the electrolyte with saturated LiCl in ethanol)
- **TE-403** Thermistor electrode (option, P/N D252415-A)



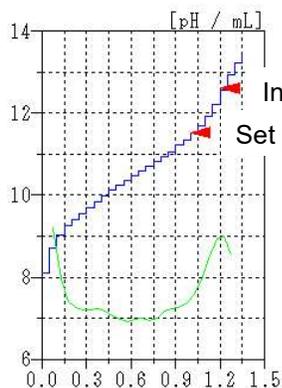
Model: **COM-1700S**

Condition parameters (example)

Master File 1 Condition 1 (for BLANK)				Master File 2 Condition 2 (for TAN measurement)			
Method	Auto			Method	Aut/Set		
Buret No.	1	Mode No.	22	BURET No.	1	Mode No.	41
Amp. No.	1	Pre Int	0 sec	Amp. No.	1	Pre Int	90 sec
Meas Unit	pH	Del K	0	Meas Unit	pH	Del K	9
S-Timer	120 sec	Del Sens	0 mV	S-Timer	120 sec	Del Sens	0 mV
CP mL	0 mL	Int Time	60 sec	CP mL	0 mL	Int Time	60 sec
DP mL	0 mL	Int Sens	0 mV	Direction	UP	Int Sens	5 mV
End Sens	5000	Brt Speed	2	DP mL	0 mL	Brt Speed	2
Over mL	0 mL	Pulse	20	End Point	※11.7 pH	Pulse	40
Max. volume	1 mL			Over mL	0 mL		
				Max Volume	20 mL		
Size	0 g			Unit	mg/g		
Blank	0 mL			Size	--- g		
Factor	Titer of the titrant			Blank	BLANK result value		
Molarity	0.1 mol/L			Factor	Titre of the titrant		
K	56.1 (as KOH)			Molarity	0.1 mol/L		
L	0			K	56.1 (as KOH)		
Formula	D			L	0		
				Formula	(D-B)*K*F*M/S to be set automatically.		

※The meter reading of aqueous buffer solution shall be entered as the set pH point when no definite inflections are obtained.

Measurement result example



In general, there are two types of samples; the ones that give clear inflection points of on the titration curves, and the others that show no inflection in which a certain pH preset on the titration curve (pH indicated by non-aqueous basic buffer) is considered the end point. “Auto” method can be used for the former type to take the inflection point as the end point. For the latter, “Set” method can be applied to take the end point at the preset pH. “Auto/Set” method used in this measurement example is useful to consider the results by both of Auto and Set.

Information plus**1. Maintenance of electrode performance**

While this titration used a glass electrode and a reference electrode for titration, the response of the glass electrode may deteriorate or the electromotive force may deteriorate when titration is repeated for a long period. Thus it can be restored by immersing in water periodically. In addition, the inner KCl solution may precipitate on the liquid junction block of the reference electrode and cause a potential difference fluctuation. It is important to immerse the glass electrode in water periodically to restore the performance.

2. Buret maintenance

Since alcoholic KOH is used as the titrant for total acid value measurement, crystals form within the buret cylinder or the sliding block between the buret cylinder and plunger. It is important that they are rinsed with water regularly. If the buret is not to be used for a long period, remove the titrant and wash well before putting into storage.

3. The effect of temperature change on the titer of the titrant

Organic solvent is used in the titrant of this measurement, and caution is required due to the change in volume with respect to temperature change (approximately 0.11% change at 1°C). This is larger compared to normal titrants with aqueous solution. It is important that measurement is taken at a temperature that is as constant as possible.

For more information, please feel free to contact:

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