

HIRANUMA APPLICATION DATA	Automatic Titrator	Data No.	L5	Jun.6. 2017
Lubricant petroleum products	Acid number in Refrigerating machine oil			

1. Abstract

Refrigerating machine oil is used in a state mixed with refrigerant such as hydrofluorocarbon. The official standard of refrigerant (e.g. JIS K 2211) specifies the acid number test according to JIS K 2501. It is indicated by "milligrams of potassium hydroxide required to neutralize acidic components contained in 1 g of the sample".

In this article, we apply the color-indicator titration method described in JIS K2501 to automatic titrator, and introduce measurement of acid number in refrigerating machine oil by photometric titration. Acid and base number with color-indicator titration is also regulated in ASTM D974. *p*-Naphtholbenzein is used as color indicator.

2. Configuration of instruments and reagents

(1) Configuration of instruments

Main unit : Hiranuma automatic titrator COM Series with photometric unit M type
 Electrode : Interference filter 650 nm

(2) Reagents

Titrant : 0.1 mol/L potassium hydroxide in 2-propanol
 Titration solvent : Mixture of 500 mL of Toluene, 495 mL of 2-propanol and 5 mL of water
 Indicator : 1 g of *p*-naphtholbenzein dissolved in 100 mL of titration solvent

3. Measurement procedure

(1) Take 20 g of sample into 200 mL tall beaker and weigh accurately to 0.1 mg digits.

Note that the weight of sample will be changed depending on the acid number.

(2) Add 100 mL of titration solvent and dissolve sample by stirrer.

The stirrer speed must be adjusted to avoid the scattering of contents or taking the air into the solution.

(3) Immerse the electrodes and titrate by alcoholic KOH titrant. Also, perform the blank test with the same procedure of sample measurement.

4. Measurement conditions and results

Examples of titration conditions

Measurement of blank

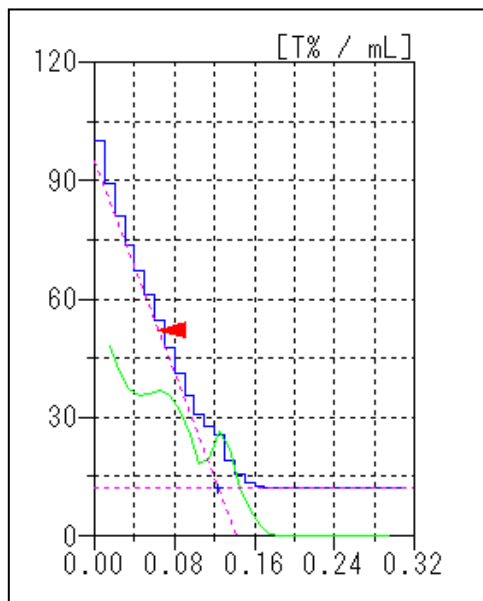
Cndt No.	37	ConstantNo.	37	Mode No.	41
Method	B-Cross	Size	0 g	Int Time Max	60 sec
Buret No.	1	Blank	0 mL	Del K	0
Amp No.	2	Molarity	0.1 mol/L	Del Sens	0 mV
D. Unit	T%	Factor	0.9775	Int Time	10 sec
S-Timer	60 sec	K	56.1	Int Sens	20 mV
C.P. mL	0 mL	L	0	Brst Speed	2
T Timer	0 sec	Unit	mL	Pulse	8
D.P. mL	0 mL	Formula	D		
End Sens	2000	Digits	4		
Over mL	0.3 mL	Auto In Pram.	Non		
Max.Vol.	20 mL				

Measurement of sample

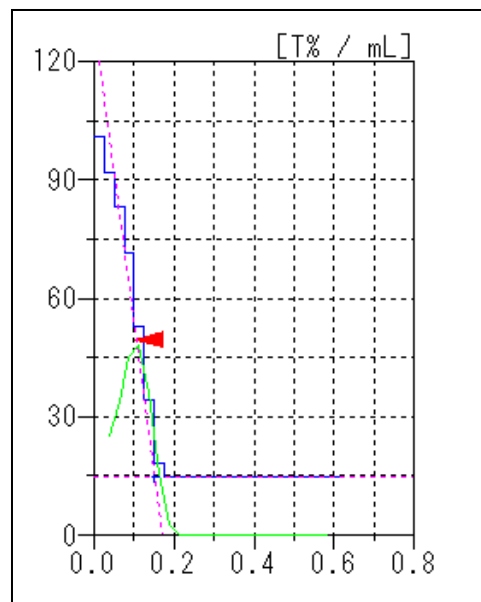
Cndt No.	38	ConstantNo.	38	Mode No.	42
Method	B-Cross	Size	20.059 g	Int Time Max	60 sec
Buret No.	1	Blank	0.123 mL	Del K	0
Amp No.	2	Molarity	0.1 mol/L	Del Sens	0 mV
D. Unit	T%	Factor	0.9775	Int Time	10 sec
S-Timer	60 sec	K	56.1	Int Sens	20 mV
C.P. mL	0 mL	L	0	Brst Speed	2
T Timer	0 sec	Unit	mg/g	Pulse	20
D.P. mL	0 mL	Formula	(D-B)*K*F*M/S		
End Sens	1000	Digits	4		
Over mL	0.5 mL	Auto In Pram.	Non		
Max.Vol.	20 mL				

Measurement results

Measurement of blank			Measurement of sample			
Measurement number	Size (g)	Titer (mL)	Measurement number	Size (g)	Titer (mL)	Base number (mgKOH/g)
1	—	0.123	1	20.0590	0.151	0.0077
2	—	0.122	2	20.0084	0.157	0.0093
	Average	0.123		Average		0.0085 mgKOH/g



Measurement of blank



Measurement of sample

Examples of titration curves

5. Note

(1) Management of the photometric probe

As the probe is used, it becomes dirty on light path and the transmittance decreases. Therefore it is necessary to wipeout adherents with soft cloth on regular bases.

(2) Maintenance of buret

It is recommended to wash the flow channel of buret with water. This is because alcoholic KOH titrant have a tendency toward crystallization. When not using for a long time, please discharge titrant and then wash flow channel with water.

(3) End point detection

When the endpoint is not detected sharply, it may be due to the absorption of carbon dioxide. In this case, purging nitrogen gas in the head space of the beaker improves end point detection.

Keyword : JIS K2211, JIS K2501, ASTM D974, Refrigerating machine oil, Refrigerant, Acid number, Color indicator titration, Photometric titration.