

Category

AUTOMATIC TITRATOR COM Series

Electrical/Electronics
technologiesTrace Cl⁻ in freezer oil

by Potentiometric titration method (non-aqueous)

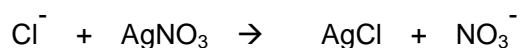
Referenced methods

Key words; Freezer oil, chlorine ion, precipitation titration, non-aqueous

Outline

Lubricant that is used in compressors of freezer or cooler circulates the cooling circuit with the coolant (CFC-type coolant). The chlorine ion contained such lubricant and coolant may corrode the internal surface of piping and cause failure.

This section introduces an example in which approximately 20g of sample was weighed precisely and dissolved in 100mL solvent mixture to be acidified with nitric acid for potentiometric titration with silver nitrate titrant.



Reagents

<i>Titrant</i>	:	0.01 mol/L silver nitrate solution
<i>Titration solvent</i>	:	Mixture of 500mL toluene, 495mL 2-propanol and 5mL of DI water 100mL per measurement
<i>Buffer</i>	:	Nitric acid (1+1) ... 0.1mL per measurement

Instruments & Electrodes

Recommended automatic titrator	COM-1700S / COM-300A
• P/N D231259-A	AG-312 Silver electrode for organic solvent use
• P/N D231243-A	MS-231 Reference electrode



Model: COM-1700S

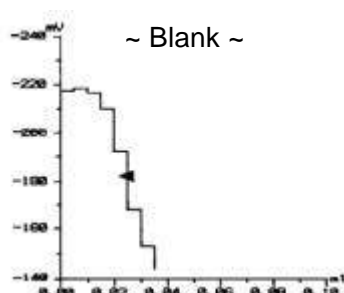


Model: COM-300A

Condition parameters (example)

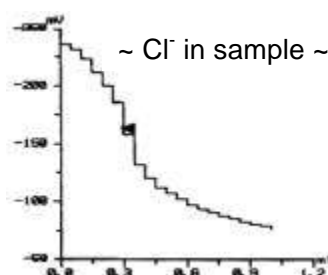
Master File 1				Master File 2			
Condition 1 (for BLANK)				Condition 2 (for measurement)			
Method	Auto			Method	Auto		
Buret No.	1	Mode No.	13	Buret No.	1	Mode No.	15
Amp. No.	2 or 3	Pre Int	0 sec	Amp. No.	2 or 3	Pre Int	0 sec
Meas Unit	mV	Del K	0	Meas Unit	mV	Del K	0
S-Timer	0 sec	Del Sens	0 mV	S-Timer	10 sec	Del Sens	0 mV
CP mL	0 mL	Int Time	5 sec	CP mL	0 mL	Int Time	5 sec
DP mL	0 mL	Int Sens	3 mV	DP mL	0 mL	Int Sens	3 mV
End Sens	1000	Brk Speed	2	End Sens	99999	Brk Speed	2
Over mL	0 mL	Pulse	4	Over mL	0mL	Pulse	8
Max. volume	20 mL			Max Volume	1 mL		
Unit	mL			Unit	ppm		
Size	0 g			Size	--- g		
Blank	0 mL			Blank	Result value from blank titration		
Factor	Titer of the titrant			Factor	Titer of the titrant		
Molarity	0.01 mol/L			Molarity	0,01 mol/L		
K	35.453 (as Cl ⁻)			K	35.453 (as Cl ⁻)		
L	-			L	-		
Formula	D			Formula	(D-B)xFxKxMx1000/S		

Measurement result example



• Blank measurement results

Sample No.	Sample volume (g)	Titration value (mL)
1	100	0.024
2	100	0.027
3	100	0.022
Avg.		0.0243 ppm



• Cl⁻ measurement results

Sample No.	Sample volume (g)	Titration value (mL)	Concentration (ppm)
1	20.046	0.292	4.762
2	20.009	0.291	4.753
Avg.			4.757 ppm
Std. Dev.			0.007 ppm
C.V.			0.15 %

Information plus1. Maintenance of electrode performance

Since this measurement is a non-aqueous titration, the liquid junction for the reference electrode may be dehydrated and increase electrical resistance. Thus it is necessary that the crystal of inner solution be removed regularly by soaking it in DI water or by loosening the sleeve for the liquid junction block.

2. NaCl standard solution addition method

The inflection point for titration curve may be unclear when chlorine ion is quantified in the trace amount (few ppm). Favorable results may be obtained when the standard addition method is used as the titration method in such cases. A known-concentration standard solution containing chlorine ion (about 10~20 ppm) is prepared and added to the sample solution prior to titration. The measurement result is calculated by subtracting the blank test value from the measurement value.

For more information, please feel free to contact:

Hiranuma Sangyo Co., Ltd.

1739 Motoyoshida-cho, Mito, Ibaraki 310-0836 JAPAN

Phone: +81-29-247-7343 / Fax: +81-29-247-0381

URL <http://www.hiranuma.com> E-mail info@hiranuma.com



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