Category

Potentiometric Titrator COM series

Electrical/Electronics technologies

Lithium carbonate for Lithium-ion battery

by Acid/base titration method

Referenced methods

Key words; secondary (rechargeable) battery, lithium, battery materials, acid/base titration

Outline

Lithium-ion rechargeable batteries are indispensable technologies in electronics/electrical industries. Primarily, Li-ion batteries consist of three fundamental components; anode, cathode, and electrolyte. Lithium carbonate is popularly used as a material for lithium cobalt oxide as cathode.

The concentration of lithium carbonate is determined by titrating with hydrochloric acid solution by acid/base titration based on the following chemical reaction.

$Li_2CO_3 + HCl \rightarrow LiHCO_3 + LiCl$ … (1)

$LiHCO_3 + HCl \rightarrow LiCl + CO_2 + H_2O$ … (2)

Reagents

Titrant : 0.1mol/L hydrochloric acid solution

Instruments & Electrodes

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

- **GE-101B** Glass electrode
- **RE-201** Reference electrode

} standard accessories

* **GR-501B** Glass-reference combination electrode is also optionally available.

Simple & compact

COM-1600ST
(incl. optional thermal printer PR-2000T2)

Robust & expandable

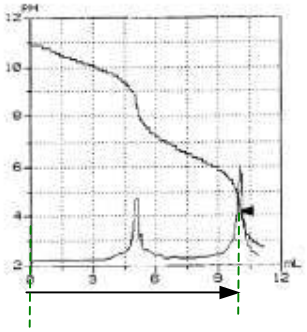
COM-1700S (built-in printer)
(incl. optional thermal printer PR-2000T2)

Condition parameters (example)

Method	Auto	Unit	%	Mode	1
Amp. No.	1	Size	--- g(aliquot of sample)	Pre Int	0 sec
Buret No.	1	Blank	0 mL	Del K	9
Meas. Unit	pH	Factor	1 or *factor of titrant	Del Sens	0 mV
S Timer	10 sec	Molarity	0.1 mol/L	Int Time	1 sec
CP mL	0 mL	K	37.9410 (half MW ofLi_2CO_3)	Int Sens	3 mV
T Timer	0 sec	L	---- (total amount of diluted sample)	Brt Speed	2
DP mL	6 mL	Formula	D×F×M×KxL/S/100	Pulse	40
End Sens	500				
Over mL	1.00 mL				
Max Volume	50 mL				

※ In this example, introduce about 2.5g of the sample into a beaker and add about 200g of water to dissolve. 10mL of the sample solution is used per measurement.

Measurement result example



Since lithium carbonate reacts with hydrochloric acid in two phases, two inflection points will be obtained. If purity of lithium carbonate is high and no coexisting substances such as lithium hydroxide is contained, the concentration of lithium carbonate is calculated from the total amount of titrant consumed to the second inflection point.
Using two-step titration with two combined condition files is also useful for this kind of multiple end-point titrations.

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