Application Memo
Acid Dissociation Constant of Sodium Carbonate

Industry	Inorganic chemical industry
Instrument	Automatic potentiometric titrator
Measurement method	Acid-base titration
Standards	

1. Overview

The acid dissociation constant is defined as:

$$pKa = pH - \log \frac{[B]}{[BH^+]}$$

$$BH^+ \rightleftharpoons B + H^+$$

[B]: Base (Brönsted's definition)
[BH+]: Acid

From this equation, it is known that pKa equals pH when [B] equals [BH+].　More precisely, [B] nearly equals [BH+] at this half-equivalence point, but the error is small in the range of pKa=3 to 11. Therefore, we regard the value of pH at this point as pKa.

pKa = The value of pH at the half-equivalence point on the titer to the endpoint

In this application memo, the acid dissociation constant of the prepared 0.5mol/L sodium carbonate sample was determined by titrating it with 1mol/L hydrochloric acid by potentiometric titration method. (The endpoints of the titration are the maximal inflection points on the titration curve.)

2. Apparatus

Main unit	Automatic potentiometric titrator (preamplifier STD)
Electrode	Combined glass electrode Temperature compensation electrode

3. Reagents

Titrant	1mol/L sodium hydroxide solution
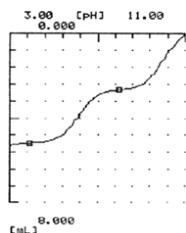
4. Example

—Measurement results—

—Titration curve—

Run	Size (mL)	Vol. (mL)		pKa			Statistics		
		EP1	EP2	0-EP1	EP1-EP2			pK1	pK2
1	5.0	2.7115	5.1689	9.936	6.1244	Mean	9.9265pKa	6.1309pKa
2	5.0	2.6837	5.1683	9.9179	6.1043	SD	0.0091pKa	0.0304pKa
3	5.0	2.6811	5.0597	9.9255	6.1641	RSD	0.09%	0.50%

Please feel free to contact us for any further information.
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