KEM **Application Note** №TIC-99325

Pharmaceutical

Sodium Hydrogen Carbonate in Stomach Medicine

Acid·base titration by
Automatic Potentiometric Titrator

Standard	Japanese pharmacopoeia codex 15	

1.Abstract

Sodium hydrogen carbonate is used in antacid or other pharmaceuticals. Here, a sample from commercially sold stomach medicine is titrated with 0.5mol/L sulfuric acid according to Japanese Pharmacopoeia codex 15. The contained sodium hydrogen carbonate is determined by the endpoint, which is the maximum inflexion point on titration curve.

$$2NaHCO_3 + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2CO_3$$

2.Reference

1) Japanese pharmacopoeia codex 15 ：
Quantitative determination of Sodium hydrogen carbonate

3.Cautions in measurement

1) Use water or solvent without carbon dioxide in it. Refrain from ambient carbon dioxide which may affect chemical reaction during measurement.
2) Obtain the factor of standard 0.5mol/L sulfuric acid using carbon dioxide according to JIS K 8001.
3) Sodium hydrogen carbonate gradually dissolves in damp air. Handle with care.

4.Post-measurement care

The electrode after rinsed with pure water must be kept in pure water in a beaker so that its tip may not dry up.

5.Test equipment

Main unit : Automatic potentiometric titrator（Standard preamplifier: STD－）
Electrode : standard Combination glass electrode
standard Temperature compensation electrode

6.Reagent

Reagent : 0.5mo1/L sulfuric acid

7.Measurement procedure

—Measurement—
1) Prepare approximately 2g of sample in a 200mL beaker.
2) Add pure water to make it total 100mL.
3) Titrate with 0.5mol/L sulfuric acid.

8.Formula

Content (%) = (EP1 － BL1) × TF × C1 × K1 / SIZE
EP1 : Titration volume (mL)
BL1 : Blank level (mL)=0
TF : Factor =1.008
C1 : Concentration conversion coefficient =84.01
(Sodium hydrogen carbonate (mg) equivalent to 1mL of 0.5mol/L H_2SO_4)
K1 : Unit conversion coefficient =0.1
SIZE : Sample size (g)

9.Example of measurement

－Ambient condition－

Room temperature : 22.5 ℃	Humidity : 47 %	Weather : Cloudy

The below test data were obtained from titration by AT-510 unit.

-Titration parameter-

Model : AT-510
Method No. : 19
<Auto Intermit>

<Titration>

Form	:	EP Stop
APB No.	:	1
Unit No.	:	1
Detector No.	:	1
Unit	:	pH
Max.Volume	:	8.0mL
Wait Time	:	0s
Direction	:	Auto

<Control>

End Point No.	:	1
End sense	:	Auto
End Point Area	:	Off
Separation	:	Off
Over Titr.Vol.	:	0mL
Gain	:	3
Data samp.Pot.	:	4.0mV
Data samp.Vol.	:	0.5mL
Stability	:	0.5mV/s
Delay Time	:	1s
Limit Time	:	30s

<Calculation>

Calc. Type	:	Sample
Conc.1	:	Set

CO1=
(EP1-BL1)*TF*K1*C1/SIZE

Unit	:	%
EP No.	:	1
Temp.Comp.	:	Off

<Constant>

C1(mg/mL)	:	84.01
K1	:	0.1

<Titr. Constant>

Factor	:	1.008
Conc	:	0.5

<Blank>

Blank1	:	0.0

-Titration curve-

*** R e s u l t ***

Sample No. : 60-01
Date : 1999/08/10 10:10
Sample ID : NaHCO3

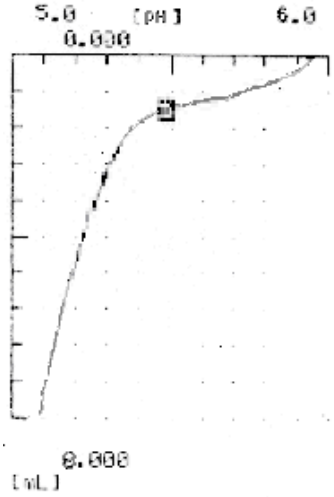
Method No. : 19
<Auto Intermit>
Method Name : NaHCO3

Titr. Time : 00:10:45

Size : 1.960g

Conc-1 : 5.2084%

End point-1
Volume : 1.2055mL
Potential : 5.45pH



Meaning of printout data:

≪Titration parameter≫
Form: of titration / APB No. the power burette used in titration / Unit No.:APB Unit File number
Detector No.: the detector used in titration / Max Volume: of titration / Wait Time: before titration starts
Direction.: of titration
≪Control parameter≫
End Point No.: total EPs / End sense: EP direction / End Point Area: detection area
Separation: of potential level / Over Titr.Vol.: over-titration volume / Gain: of detection signal
Data samp.Pot. potential changes of sampling detection signal / Data samp.Vol.: titration volume of sampling signal
Stability: level of EP stability / Delay Time: before stability check / Limit Time: for stability check
≪Result parameter≫
Calc.Type of formula / Conc.1: formula 1 / Unit: of results /EP No. for calculation / Temp.Comp.: of titration liquid
C1(mg/mL): concentration conversion coefficient /K1: unit conversion coeff. / Factor: of reagent
Blank1 blank level 1

－Measurement results－

n	Sample (g)	Titration (mL)	Content (%)
1	1.960	1.2055	5.2084
2	1.960	1.2077	5.2179
3	1.960	1.2045	5.2041

Statistics	
Mean	5.2101%
SD	0.007%
RSD	0.136%

＊ The above results were obtained by 3 tests of the same sample.

＊ Red underline shows the data from page 3/4.

10.Summary

Sodium hydrogen carbonate is used in antacid for stomach ulcer or irritation. Since it gradually dissolves in damp air, it is necessary to check its concentration for quality control by way of titration.

The sample measurement this time shows a good repeatability with 0.1% relative standard deviation.

Precise and reliable measurement is assured by the automated potentiometry.

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