Thermo SCIENTIFIC

Potentiometric Titration Application Notes Applications Log # **337C**

Overview Total, effective and active alkali, sulfidity and causticity concentrations are determined in a sequence using the ABC Preset Endpoint titration technique with an Orion pH electrode, and hydrochloric acid as the titrant. The Orion 960 Autotitrator PLUS determines the endpoints and calculates the concentrations of the desired species in the sample. This note describes the method for the third endpoint (pH 4.1).

Market	Paper and Pulp	***Species Measured***	ABC, Alkalinity, 3rd endpoint
Sample	White Liquor	***Sample Size***	3.0 mL
		Typical Concentration	0.8 lb/gal active alkali
Technique #	8 Preset Endpoint	***Electrode***	Ross pH electrode 8172BN

Solutions 1M hydrochloric acid; electrode storage 91001; deionized water

Solutions preparation: 1M HCl: Add 83 mL of concentrated hydrochloric acid to about 750 mL DI. Mix well. Dilute to 1 L with DI.

Titrant standardization Titrate 3 mL of 1.00N sodium hydroxide standard solution diluted to 50 mL with DI. Use technique 11 and reaction ratio of 1.0

Sample Prep Pipet 3 mL of white liquor into an analysis beaker containing 50 mL of deionized water. Titrate with 1M hydrochloric acid in a sequence of methods to endpoints at pH 11, pH 8.3, and pH 4.1. This log describes the method for the third endpoint, pH 4.1.

Write three methods, one for each endpoint, as described in logs 337A, 337B, and 337C. Link in a sequence. Select Special Calculation, ABC in the sequence routine. See Section IX.3 in 960 manual for details.

Statistics

# of Trials	4	***Mean***	0.832	***%CV***	1.1	***Analysis Time***	

Comments Rinse the electrodes, stirrer, and dispenser probe thoroughly between measurements with deionized water.

Use Applications Logs for ABC, Alkalinity, 1st endpoint (337A), 2nd endpoint (337B), and 3rd endpoint (337C) together.

Method Parameters

Sample Volume/Weight	3.0 mL	***Timed or Stability Readings***	3.0 seconds timed
Constant Increment	0.15 mL	***Number of Endpoints***	1 at pH 4.1
Max Titrant Volume	7 mL	***Desired Units***	…v
Molecular weight	31.00	***Predose***	1 mL
Prestir	none	***Additional Parameters***	Modify method as required.
Reaction Ratio	1		

Results

TOTAL ALKALI

```
quantity No. 1 =    1.036000
quantity No. 2 =    1.039000
quantity No. 3 =    1.041000
quantity No. 4 =    1.039000
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Mean=             1.038750
Rel Std Dev=         0.20%
```

EFFECTIVE ALKALI

```
quantity No. 1 =    0.703000
quantity No. 2 =    0.696000
quantity No. 3 =    0.688000
quantity No. 4 =    0.677000
-------------------------
Mean=             0.691000
Rel Std Dev=         1.62%
```

ACTIVE ALKALI

```
quantity No. 1 =    0.841000
quantity No. 2 =    0.837000
quantity No. 3 =    0.830000
quantity No. 4 =    0.820000
-------------------------
Mean=             0.832000
Rel Std Dev=         1.11%
```

% SULFIDITY

```
quantity No. 1 =   26.700000
quantity No. 2 =   27.300000
quantity No. 3 =   27.300000
quantity No. 4 =   27.600000
-------------------------
Mean=             27.225000
Rel Std Dev=         1.39%
```

% CAUSTICITY

```
quantity No. 1 =   74.300000
quantity No. 2 =   73.300000
quantity No. 3 =   72.100000
quantity No. 4 =   70.900000
-------------------------
Mean=             72.650000
Rel Std Dev=         2.03%
```

ABC TITRATION (lb/gal as Na 2 O)

```
A(total)     =1.039
B(effective)=0.696
C(active)    =0.837
SULFIDITY   =27.3%
CAUSTICITY  =73.3%
```