Organic Application Note

Nitrogen in Wort and Beer

Accessories
502-167 Tin Capsules, digital pipette, or eyedropper

Sample Weight
0.8 g

Calibration Standard
502-092 EDTA, Glycine solution (refer to reverse side for detailed instructions), or other suitable standard

Analysis Time
3 minutes

Furnace Temperature
950°C

Flow Profile
High 30, High 30, Med, End

Atmospheric Blank (N)
0.00 (liquids), 0.04 (solids)

Loop Select
10 cc (low range)

Procedure
1. Prepare the instrument by following the procedure as outlined in the operator's instruction manual.
2. Analyze blanks (gas) until a plateau is reached. Analyze three to five additional blanks and set blank using these data.
3. Analyze five glycine solution standards (using 502-167 Tin Capsule), and drift correct (if using the PC option). *NOTE: Each method on PC requires prior calibration with multiple weights of EDTA (0.035 to 0.4 g). If PC is not installed, analyze five EDTA standards and calibrate using the DSP screen menu.*
4. To analyze a sample.
   a. Tare a 502-167 Tin Capsule.
   b. Gently swirl the sample. Using a digital pipette or eyedropper, weigh 0.8 g of sample into the capsule, leaving the capsule open (do not crimp). Do not allow bubbles to form in the capsule.
   c. Enter the weight into the weight stack.
   d. Press manual loading.
   e. Place sample in the loading head, with head open.
   f. Press Analyze.
5. Analyze a standard at end of set to verify calibration.

Typical Results

Sample	Weight (g)	FP-528 % Nitrogen	Kjeldahl % Nitrogen
Sample #1	0.8403	0.076	—
	0.8344	0.075	—
	0.8256	0.077	—
	Avg.	**0.076**	**0.0736**
	Std. Dev.	**0.001**	**—**
Sample #2	0.8420	0.082	—
	0.8772	0.081	—
	0.8529	0.082	—
	Avg.	**0.082**	**0.0824**
	Std. Dev.	**0.001**	

Sample	Weight (g)	FP-528 % Nitrogen	Kjeldahl % Nitrogen
Sample #3	0.8270	0.098	—
	0.8214	0.095	—
	0.8269	0.096	—
	Avg.	**0.096**	**0.0967**
	Std. Dev.	**0.002**	**—**

FP-528

GLYCINE SOLUTION PREPARATION

1. The following formula can be used to make a specific concentration:

$$G = \frac{C}{(0.99^{\dagger} \bullet 0.18658)}$$

where: C = desired nitrogen concentration as percent
G = grams of glycine powder

Example for 1% solution:

$$G = \frac{1}{(0.99^{\dagger} \bullet 0.18658)} = 5.414$$

NOTE: A quick reference chart, shown below, shows the grams of glycine powder needed to reach given concentrations.

2. Place a flask on the balance and tare. The flask should be large enough to hold 100 ml (where 100 g = 100 ml).
3. Add the amount of glycine calculated in step 1 and record the mass.
4. Add distilled water until the total mass equals 100 g, then record the mass (W).
5. Seal the flask and mix the contents.
6. To figure the exact concentration:

$$\% \text{ Nitrogen} = \frac{G\,(18.658 \bullet 0.99^{\dagger})}{W}$$

where: G = mass in grams of glycine recorded in step 3
W = mass in grams of water and glycine powder recorded in step 4

7. If the distilled water is not pure, determining the nitrogen concentration may be necessary.
   a. Analyze five samples of distilled water.
   b. Average the nitrogen content of the five samples (A).
   c. Add this average to % nitrogen calculated for the calibration solution.

Example: To make a calibration solution of approximately 0.3% nitrogen:
where: G = 1.672 g
W = 99.824 g
A = 0.004%

$$\frac{1.672(18.654)}{(99.824)} + 0.004 = 0.316\%\ \text{N}$$

QUICK REFERENCE CONCENTRATION TABLE

Nitrogen Concentration	Grams of Glycine†
0.10%	0.541
0.30%	1.624
0.50%	2.707
0.75%	4.060
1.00%	5.414

†*Assuming 99.0% purity of glycine powder.*

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