GLI Method Summary
Determination of Nitrogen by the Kjeldahl Method

Governing SOP: E7-1 Rev 15
Analyte: N
Range: 0.3–3 mg N

*Upper limit of range can be extended by dilution.

**Summary**
The general principle of the Kjeldahl method depends upon the conversion of nitrogen to ammonium acid sulfate by the digestion of the organic material with concentrated sulfuric acid, sodium sulfate and copper sulfate catalyst.

**Scope**
This method is applicable to amines, amides, amino acids and their derivatives but generally fails to give quantitative results with heterocyclic nitrogen, N=N linkages and N–O linkages. This method fails to account for nitrogen in the form of azide, azine, azo, hydrazone, nitrate, nitrite, nitrile, nitro, nitroso, oxime, and semi-carbazone.

**Decomposition**
The sample is digested in a mixture of concentrated sulfuric acid, sodium sulfate, and copper sulfate. The organic material is oxidized and the nitrogen converted to ammonium sulfate. Excess sodium hydroxide is added, and the ammonia is distilled and absorbed in a boric acid solution.

**Determination**
1. Titration with 0.01 N or 0.1 N H2SO4 to a methyl red/methylene blue indicator endpoint.
   OR
2. For low level titrations, ion-selective electrode (GLI Analytical Procedure E7-6)

**Quantitation Limit**
0.3 mg N (titration)

**Precision & Accuracy**
<table>
<thead>
<tr>
<th></th>
<th>RSD</th>
<th>RE</th>
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<tbody>
<tr>
<td>k-0703</td>
<td>1.71</td>
<td>-0.48</td>
</tr>
<tr>
<td>k-0704</td>
<td>3.51</td>
<td>-0.74</td>
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**Interferences**
Excess NO3, very large quantity of salt or inorganic solids

**Calculations**

\[
% \text{Nitrogen} = \frac{(mL \text{ titration} - mL \text{ blank}) \times (N) \times (14.01) \times (100)}{(mg \text{ of sample})}
\]

N = normality of titrant

**References**
ASTM E-778-87, Nitrogen in the Analysis Samples of Refuse-Derived Fuel.
USP36/NF31, Nitrogen Determination <461>, Method I, II.

**Other GLI Procedures**
E7-6 Nitrogen by Ion Selective Electrode
ME-2 CHN Determination using the PerkinElmer 240 Elemental Analyzer
ME-11 CHN Determination using the LECO CHN 2000
S-520 Determination of Non-Protein Nitrogen