

## Portable NIR Food Analyzer Kit

- ▶ Analyzes protein, oil, and moisture content on site!
- ▶ Displays results in less than 1 minute

Enhance the profitability of your grains and dairy products by ensuring their optimum protein, oil, and moisture contents.

Analyzer is designed for rugged use—take with you on the plant floor or in the field.

Meter analyzes protein and oil both on an as-is basis and a constant moisture (CM) basis. Simply pour sample into sample holder and place holder into the meter. Meter displays results in less than one minute. Download data to your 486 computer or better with the included calibration software and RS-232 cable.

Factory-set calibrations for HRS, HRW, protein and moisture in SWW, durum wheat, SRW, 2 row barley, 6 row barley, oats, corn, soybean, canola, mustard, flax, milo, or long and medium grain rough rice. Oil calibration is included with corn, soybean, canola, mustard, and flax calibrations.

59824-00

**What's included:** analyzer, 16-mm sample cup for general analysis, liquid/slurry sample holder, light shield, calibration software, RS-232 cable, and batteries. Order optional factory-set calibrations, specialty sample cups, printer, storage memory, power adapters, and carrying case separately below.

**A-59824-00** Food analyzer kit

### Specifications

**Range:** 1.0 to 95%  
**Spectrum range:** 12 filters covering wavelengths from 893 to 1045 nm  
**Optical range:** 0 to 6 AU  
**Resolution:** 0.0001 AU  
**Stability:** 0.05 Mili-AU  
**Measurement time:** usually less than 1 minute

**Sample size:** approximately 100 grams  
**Output:** RS-232 via included 25-pin connector with 6-ft cable  
**Power:** six 1.5 V AA alkaline batteries (included), optional 120 VAC or 220 VAC adapter (order below)  
**Dimensions:** 10½"L x 4¾"W x 3"H



### Accessories

**A-59824-11** Additional factory calibrations. Please specify your choice of up to 10 factory set calibrations. Must be ordered at the same time as kit 59824-00

**A-59824-19** Memory for downloading up to 25 samples to your computer. Must be ordered at the same time as kit

**A-59824-13** Sample cup, 10-mm. Required to analyze milo, mustard, and flax

**A-59824-16** Sample cup, 16-mm. Standard cup for general analysis

**A-59824-17** Printer. Includes three rolls of paper

**A-59824-18** Printer paper. Box of 10 rolls

**A-59824-14** Power adapter, 120 VAC

**A-59824-15** Power adapter, 220 VAC

**A-59824-10** Carrying case, aluminum

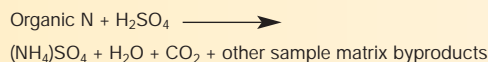
## Kjeldahl Basics

The Kjeldahl method was developed over 100 years ago for determining the nitrogen contents in organic and inorganic substances. Although the technique and apparatus have been modified over the years, the basic principles introduced by Johan Kjeldahl still endure today.

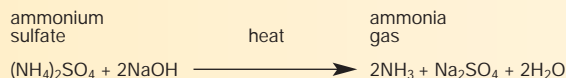
Kjeldahl nitrogen determinations are performed on a variety of substances such as meat, feed, grain, wastewater, soil, and many other samples. Various scientific associations approve and have refined the Kjeldahl method, including the AOAC International (formerly the Association of Official Analytical Chemists), Association of American Cereal Chemists, American Oil Chemists Society, Environmental Protection Agency, International Standards Organization, and United States Department of Agriculture.

The Kjeldahl method may be broken down into three main steps: digestion, distillation, and titration.

**Digestion** is accomplished by boiling a homogeneous sample in concentrated sulfuric acid. The end result is an ammonium sulfate solution. The general equation for the digestion of an organic sample is shown below:



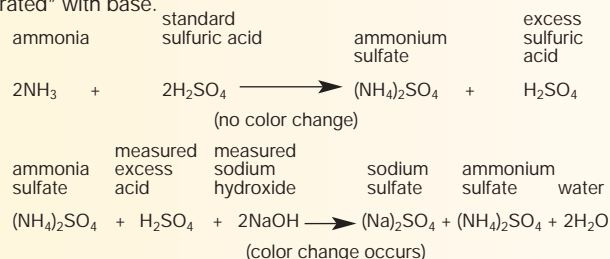
**Distillation** is accomplished by adding excess base to the digestion product to convert  $\text{NH}_4^+$  to  $\text{NH}_3$  as indicated in the following equation. The  $\text{NH}_3$  is recovered by distilling the reaction product.



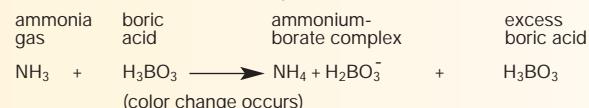
**Titration** quantifies the amount of ammonia in the receiving solution. The amount of nitrogen in a sample can be calculated from the quantified amount of ammonia ion in the receiving solution.

There are two types of titration methods: back and direct. Both methods indicate the ammonia present in the distillate with a color change.

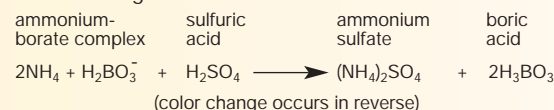
In back titration (commonly used in macro Kjeldahl), the ammonia is captured by a carefully measured excess of a standardized acid solution in the receiving flask. The excess of acid in the receiving solution keeps the pH low, and the indicator does not change until the solution is "back titrated" with base.



In direct titration, if boric acid is used as the receiving solution instead of a standardized mineral acid, the chemical reaction is:



The boric acid captures the ammonia gas, forming an ammonium-borate complex. As the ammonia collects, the color of the receiving solutions changes.



The boric acid method has the advantages that only one standard solution is necessary for the determination and that the solution has a long shelf life.