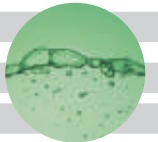


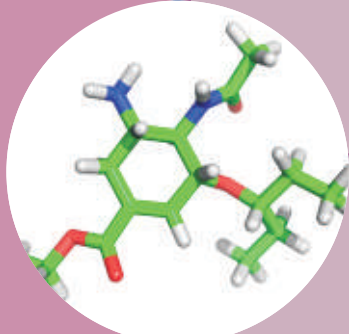
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Distillation & Digestion Unit

Models:
ACM-54095 W





Models:
• ACM-54093 W



Introduction And Process Explanation

The Kjeldahl method for the determination of organic nitrogen is the worldwide standard for the purpose of calculating the protein content in both human food and animal food. Additionally, Kjeldahl has been adapted as a standard method of nitrogen analysis in water, wastewater, fertilizer, and fossil fuels, to name a few.

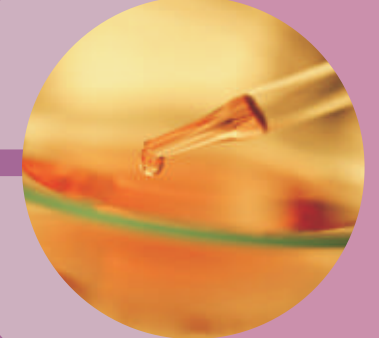
The Kjeldahl method for nitrogen analysis is composed of three distinct steps. These are digestion, distillation, and titration.

DIGESTION STEP

The purpose of the digestion step is to break the intricate structure and chemical bonds that hold a chemical substance

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(piece of meat, cup of flour or quart of oil) down to simple chemicals and ionic structures. Specifically, proteins and other forms of nitrogen are broken down and converted to ammonia.

To accomplish this, one to two grams of the sample are placed on a digestion tube with 12-15 ml of concentrated sulfuric acid (H_2SO_4). Seven grams of potassium sulfate (K_2SO_4) and a metallic catalyst, usually copper, are then added. The digestion tube is laced into a digestion block where it is heated to the boiling temperature of the mixture. Digestion is usually completed after one hour at $370^{\circ}C$ to $400^{\circ}C$.

The Distillation Step

Distillation involves separation of ammonia - nitrogen from the digestate. This is accomplished by raising the pH with sodium hydroxide ($NaOH$). This changes the ammonium (NH_4^+) ion to ammonia (NH_3). Now it is possible to separate the nitrogen

by distilling the ammonia and collecting the distillate in a suitable trapping medium. Today collection of ammonia is usually done by absorption into a solution of four percent boric acid. The ammonia is bound to the boric acid in the form of ammonium borate.

The Titration Step

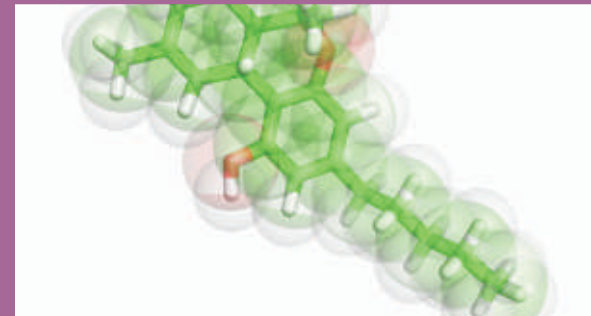
Determination of the amount of nitrogen on the condensate flask can be accomplished by several methods. The most common is titration of the ammonia with a standard solution of one-tenth normal hydrochloric acid ($0.1 N HCl$) in the presence of mixed indicator. The mixed indicators (bromocresol green and methyl red) are available in the four percent boric acid solution.

Calculation

After all this chemistry it is now time to calculate the amount of nitrogen present in the sample. This calculation can either be performed as percent nitrogen or percent protein. For percent

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nitrogen:

$$\% N = \frac{14.01 \times (\text{ml titrant} - \text{ml blank}) - (\text{N of titrant}) \times 100}{\text{Sample Wt. (grams)} \times 1000}$$

It has been shown that protein is 16% nitrogen. (Wheat and dairy products are some exceptions.) By dividing 100 by 16, we get the conversion factor for nitrogen to protein of 6.25. Hence, the percent protein is calculated as follows:

$$\% \text{ Protein} = 6.25 \times \% N$$

Product Information

Weiber Kjeldahl Units have a minimum of 3 mantles and a maximum of 6 mantles which are made of a knitted layer of glass fabric combined with flexible heating element, encased in Mild Steel housing. Over and above this layer of glass fabric accommodating the flexible heater, another layer of glass cloth

is placed on the lower mantle held firmly by a circular aluminum ring. Temperature ranges from ambient to 350°C controlled by a Sun Vic Energy Regulator with either a single control or individual controls, with corresponding indicating lamps.

The Weiber DISTILLATION UNITS are provided with a fume duct which is held by clamps (provided with the unit) suspended on a stand having mobility for both horizontal and vertical movements. The Weiber DIGESTION UNITS are provided with the above features along with a condensing tank with individual condensing taps.

The DIGESTION AND DISTILLATION COMBINED UNITS have the features of both Digestion and Distillation which are placed on a painted MS angle stand with their respective controls. Supplied with glass parts. Works on 220/230 Volts Ac

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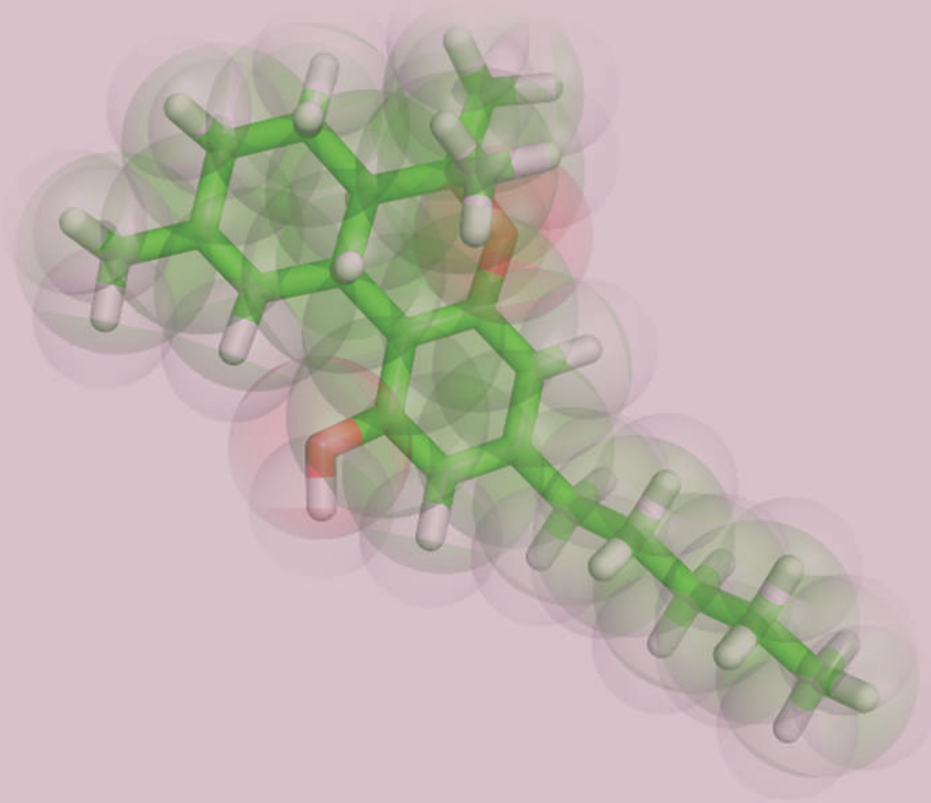
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