



Quality control in alcoholic beverages

Applications in steam distillation

For more than 50 years BUCHI has been developing ingenious solutions for direct steam distillation and Kjeldahl applications. Our solutions include innovative products for the entire process workflow, bespoke application support, practical apps and professional maintenance.



Core messages to our customers

BUCHI creates added value with “Quality in your hands”

“Quality in your hands” is the guiding principle that shapes our philosophy and our actions. It challenges us to provide outstanding services that are precisely tailored to your needs. This means that we must stay in close contact with our customers. That is why we keep in touch and continue to work very hard to understand you and your business even better.

We help you by providing high-quality products, systems, solutions, applications and services that offer you added value. This allows you to focus entirely on your processes and your work.



Easy

You handle complex processes, do challenging work and want to focus on what is essential. We support you by providing carefully designed solutions as well as instruments and systems that are easy to operate.



Competent

You need products, systems, solutions, applications and services that are precisely tailored to your needs. We have the technological expertise and decades of experience needed to provide competent support and work with you to continually improve our market services.



Reliable

You want to be able to rely completely on your partner for products, systems, solutions, applications and services. We guarantee the quality and functionality of our equipment and will continue to help you quickly and efficiently whenever something does not operate to your satisfaction.



Cost-effective

You want to achieve the best possible results using efficient solutions. We help you to handle your jobs and processes economically. We strive to create a high level of economic benefit and maximum added value for you.



Safe

You are working in an environment in which safety is a high priority. By collaborating closely with you, we do everything in our power to make our products, systems, solutions, applications and services as safe as possible for people and the environment.



Global

You value personalized service and short communication channels. As an international family-owned business with our own subsidiaries and qualified distributors, we have a presence wherever our customers are located. Our local staff and the large number of satisfied customers around the world give you the assurance that you are working with the right partner.



Sustainable

You prefer a partner who acts responsibly when it comes to current environmental challenges. We support environmentally friendly processes and manufacture products that have a long service life. We utilize advanced technologies in order to conserve energy and water and leave the smallest environmental footprint possible.



Broad application flexibility

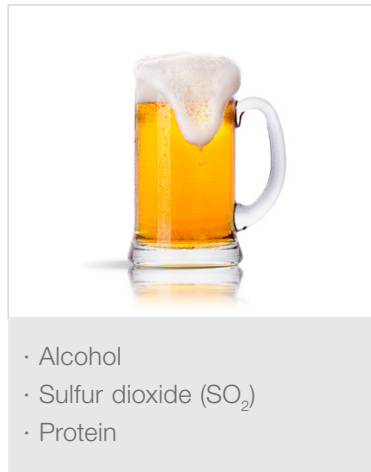
Direct distillation of steam-volatile compounds

When dealing with limited lab space and demands for different analytes requiring direct steam distillation BUCHI is the first choice to work with. We offer modular all-in-one solutions covering various steam-volatile compounds with manual or even semi-automated operation and direct link to external titrators.

Winery



Brewery



Distillery



Alcohol

An alcoholic beverage typically contains 3 % to 45 % alcohol (ethanol). According to law the alcohol content must be declared and labelled on alcoholic beverages. The purpose of the regulation is to provide pertinent information to the consumer.

Sulfur dioxide

Sulfites are naturally formed in the process of producing wine and beer. On the one hand sulfite in beer is desired because of its anti-oxidative effect and capacity to bind carbonyl compounds that cause a moldy taste. On the other hand high sulfite contents cause an unwanted taste. Any food containing more than 10 mg/L or 10 mg/kg of sulfite indicates the use of sulfiting agents and requires a label declaration.




Volatile acids

Acetic acid in wine, often referred to as volatile acidity or vinegar taint, is created by many wine spoiling yeasts and bacteria. This can be from either a by-product of fermentation or due to the spoilage of finished wine. Acetic acid bacteria produce high levels of acetic acid. The sensory threshold for acetic acid in wine is >700 mg/L, with concentrations greater than 1.2 to 1.3 g/L becoming unpleasant.

Protein

Proteins provide the essential amino acids needed to aid in the building and maintenance of body tissues. The Kjeldahl method is the worldwide reference method for the determination of nitrogen and protein.

Our flexible distillation solutions allow for performing the classical nitrogen and protein determination according to Kjeldahl, and also the direct distillation of steam volatile compounds. These solutions comprise of a recommended set of products, applications and a comprehensive service package to meet your distinctive needs.

	Alcohol	Sulfur dioxide	Volatile acids	Protein
Analyte / Method	 <p>Alcohol determination by measuring the density of the distillate</p>	 <p>SO₂ determination by steam distillation followed by back-titration</p>	 <p>Volatile acids determination by steam distillation followed by titration</p>	 <p>Protein determination according to Kjeldahl</p>
Digestion				IR and block digesters
Distillation	Distillation units featuring steam regulation	Distillation units featuring acidification	Distillation units featuring steam regulation	Distillation units with different levels of automation
Analysis	Third party density meter	Third party titrator	Third party titrator	Integrated or external titrators
Solutions by BUCHI	Alcohol determination p. 8	Sulfur dioxide determination p. 9	Volatile acid determination p. 10	Protein determination p. 11

Find detailed information at:
www.buchi.com/solution-alcoholic-beverages





The best solutions for your needs

Your most important benefits

Highly flexible and convenient

- Quick and easy switch between Kjeldahl and direct distillation without laborious reconnection of chemical tanks
- Steam volatile compounds such as alcohol, volatile acids or SO₂ are separated best by gentle distillation under reduced steam power

Safe and secure

- Safe and reliable process due to automated dosage of strong acids
- Thorough process and operator safety thanks to several safety sensors

Competent and reliable

- A team of highly qualified specialists continually improve the Application Notes with detailed descriptions
- Benefit from over 50 years of experience in steam distillation and Kjeldahl

The voice of the customer



Determination of the alcohol content

Dr. Patrick van Zuidam, Managing Director Zuidam Distillers BV, NL

Equipment: Distillation Unit K-350

Benefit: "Compared to traditional distillation configuration it saves at least 50 % space. More important is the reduction of distillation time from several hours to 5 to 10 minutes."

Explore more than 100 comprehensive case studies from all over the world on:
www.buchi.com/casestudies





Characteristics	Distillation Unit K-355	KjelFlex K-360
Sample dilution	●	●
Steam regulation	●	●
Dosage H ₃ BO ₃		●
Dosage NaOH	●	●
Dosage of strong acids	●	optional
Aspiration (sample tube and receiver)		●
Result memory		500
Method memory	9	50
Communication with titrator*		●
Port for printer		●
Port for level sensors		●

* Different titrators are possible to be connected (such as Metrohm, Mettler-Toledo, SCHOTT and Radiometer).





Sample	Regulation	BUCHI Application Note
Beer Wine Spirits Liquors	<p>EEC 2870/2000 (spirits) Loss of alcohol must be less than ≤ 0.1 % when distilling 200 mL (≤ 50 % v/v) of ethanol-water mixture</p> <p>EEC 2676/1990 (wine) OIV-MA-AS312-01A (wine) Loss of alcohol must be less than ≤ 0.1 % when distilling a 10 % ethanol-water mixture five times in succession</p>	<p>BUCHI Application Steam distillation and subsequent determination of the density</p> <p>Results 99.9 % and better recovery for:</p> <ul style="list-style-type: none"> · 50 % ethanol-water mixture · 40 % ethanol-water mixture · 10 % ethanol-water mixture · 5 % ethanol-water mixture

Application related parts	Order number
Constricted distillate outlet tube \varnothing 5 mm For alcohol distillation into a volumetric flask	043096
Slim glass splash protector without alkali inlet For efficient direct distillations	11061393
Sample tubes 300 mL (4 pcs)	037377
Sample tubes 500 mL (4 pcs)	043982
Sample tube 750 mL Including long suction tube	11058999
Kjeldahl Tablets Antifoam (1000 pcs) Reduces foaming during distillation	11057984
Density meter With repeatability of 0.00001 g/cm ³	Third party

"The introduction of the BUCHI Distillation Unit K-350 in our company made a fast and easy alcohol determination possible. It makes the alcohol determination much more reliable and not dependent from the executor anymore."

Dr. Patrick van Zuidam, Managing Director Zuidam Distillers BV, Netherlands



Sample	Regulation	BUCHI Application Note
Beer	EC 2003/1989 (declaration)	<p>BUCHI Application (patented)</p> <p>The procedure uses steam distillation into a specially designed SO₂ absorption glass in which the SO₂ reacts with a defined volume of iodine solution. Subsequently the distillate is back-titrated with sodium thio-sulfate solution.</p> <p>Results</p> <p>The patented BUCHI SO₂ method represents a fast and reliable technique for the determination of total SO₂.</p>
Wine	<p>Labeling of potential allergens, such as SO₂ at concentrations of ≥10 mg/kg or ≥10 mg/L is required</p> <p>OIV-MA-AS323-04A</p> <p>Free SO₂ is carried over by a stream of air or nitrogen and is fixed and oxidized by bubbling through a dilute and neutral solution of hydrogen peroxide.</p> <p>OIV-MA-AS323-04B</p> <p>Free SO₂ is determined by direct titration with iodine. The combined SO₂ is subsequently determined by iodometric titration after alkaline hydrolysis. When added to the free SO₂, it is expressed as the total SO₂.</p>	

Application related parts	Order number
SO ₂ absorption vessels	048680
Sample tubes 300 mL (4 pcs)	037377
Sample tubes 500 mL (4 pcs)	043982
Sample tube 750 mL Including long suction tube	11058999
Kjeldahl Tablets Antifoam (1000 pcs) Reduces foaming during distillation	11057984
Titration For redox titration	Third party

"The flexibility to do back-titration, Non-Kjeldahl application with acid resistant pump and possibility to connect external titrator with the system is the key benefit of this system."

Dr. S.S. Marwaha, Chief Executive Officer, India



Sample	Regulation	BUCHI Application Note
Wine	EEC 2676/1990 (wine) Volatile acids are separated from the wine by steam distillation; then the distillate is titrated.	<p>BUCHI Application Volatile acids are determined by steam distillation followed by titration. The BUCHI method was compared to the MSDA method.</p> <p>Results The distillation time could be reduced from 45 min (MSDA method) to 8 min (BUCHI method) with comparable results.</p>

Application related parts	Order number
Sample tubes 300 mL (4 pcs)	037377
Sample tubes 500 mL (4 pcs)	043982
Titrator Metrohm Titrino Plus 877* To be connected to the K-360 for automated determinations	11055703
Connection cable for Metrohm Titrino Plus* Connects the KjelFlex K-360 to the titrator	11055333

* Different titrators are possible to be connected (such as Metrohm, Mettler-Toledo, SCHOTT and Radiometer).



Sample	Regulation	BUCHI Application Note
Beer Malt	AOAC 920.53 (beer) Protein determination in beer by means of the Kjeldahl method.	<p>BUCHI Application</p> <p>The sample is digested with sulfuric acid and Kjeldahl Tablets followed by steam distillation and titration. To reduce the digestion time significantly the accelerated H₂O₂ digestion method can be applied.</p> <p>Results</p> <p>Reliable and reproducible results corresponding to the labelled values of the samples.</p>

Application related parts	Order number
SpeedDigester K-425 / K-436 / K-439	See Data Sheets
KjelDigester K-446 / K-449	See Data Sheets
Sample tubes 300 mL (4 pcs)	037377
User protection shield (for H ₂ O ₂ and TKN applications) Protects the user from any possible splashes, which may occur from H ₂ O ₂ usage or boiling delays	11057889
Kjeldahl Tablets Titanium (1000 pcs)	11057980
Titrator Metrohm Titrino Plus 877* To be connected to the K-360 for automated determinations	11055703
Connection cable for Metrohm Titrino Plus* Connects the KjelFlex K-360 to the titrator	11055333

* Different titrators are possible to be connected (such as Metrohm, Mettler-Toledo, SCHOTT and Radiometer).

SpeedDigester



Fast digestion at controlled temperatures enables an increased sample throughput. Multiply the instrument functionality whenever needs are changing.

KjelDigester



The KjelDigester reduces the block digestion process by up to two hours and meets the highest safety requirements.

KjelMaster



We provide solutions for both potentiometric and colorimetric titrations. The KjelMaster K-375 meets the highest demands in usability, automation, user administration and sophisticated data management.

FT-NIR



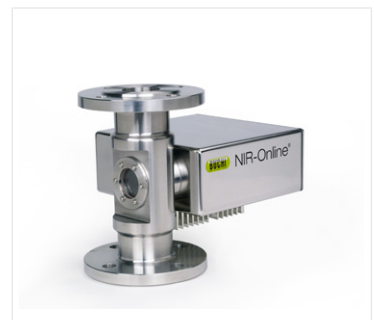
The N-500 FT-NIR spectrometer provides reliable analysis results for quality control as well as research and development in the food, beverage and feed industry.

SPE Syncore®



The Syncore® Analyst combines SPE clean-up with evaporation to pre-defined residual volumes. The ideal tool for contaminant and residue analysis.

NIR-Online®



NIR-Online® spectroscopy provides full control by continuously delivering accurate measurements within seconds.

Sample tubes



Original glassware from BUCHI guarantees safety, precision and durability that customers can rely on.

Kjeldahl Tablets



BUCHI offers not only high quality instrumentation but also approved consumables that are tested for the most common reference applications.

Apps



With the Kjeldahl Optimizer you predict the best process parameters. The Kjeldahl Reports allows you to calculate results and create reports easily.

Dumas Combustion



The DuMaster D-480 enables unattended and flexible determination of nitrogen or protein according to the Dumas combustion method.

Encapsulation



The Encapsulator B-395 Pro allows to produce microcapsules or -beads in a single step process to immobilize flavors, fragrances, vitamins or oils.

Recirculating Chiller



BUCHI Recirculating Chiller are fully integrable into any Rotavapor® system. They guarantee a sustainable operation of your sample preparation.



Support and customer service

From feasibility to preventive maintenance

You value an efficient and personalized service. Our network of professional application specialists and service technicians as well as a large number of satisfied customers around the world give you the assurance that you are working with the right partner.



Apps ease your daily work

Strong customer relationships result in a growing number of practical apps facilitating your daily routine. With the Kjeldahl Calculator you predict the right process parameters. And the Kjeldahl Reports allows you to calculate results and create reports easily.

Experience our Kjeldahl apps online:
www.buchi.com/kjeldahl/apps



Improve your applications

A team of highly qualified specialists continually improve our reference Application Notes. Ready-to-use detailed descriptions comprise of the entire procedure from milling to digestion, distillation and titration. Customized solutions are developed in close collaboration whenever you face new requirements, changing circumstances or new parameters to be determined.

Find more than 120 application notes at:
www.buchi.com/kjeldahl/applications



Discover our numerous case studies

BUCHI offers over 130 different case studies. By using real information, the online case studies bring to life the complexities of business and give you an understanding of the wide range of the applications supported by our products, systems, solutions and services.

Discover our case studies:
www.buchi.com/casestudies





Profit from workshops, trainings and seminars

We regularly offer practical seminars and workshops, often in co-operation with other partners in the field of sample preparation and analysis. Customer contributions thereby underline how our solutions facilitate the daily routine. We also attend many local and international scientific and industrial congresses.

Find an overview of our activities:
www.buchi.com/events



Use your product most effectively

We help you to set your product properly into operation. We provide thorough Installation/Operation Qualification (IQ/OQ) services to ensure compliance with FDA, GLP/GMP standards or GAMP guidelines. Whether it is because of an initial installation, requalification or relocation, we provide professional compliance verification.

Find out more about our services:
www.buchi.com/service-support



Minimize downtimes

Avoid products downtimes with preventative maintenance and tailored service packages. We offer a product warranty of one year and guarantee ten years of spare parts availability.

Get in touch with us:
www.buchi.com/warranty



Global Network

Our subsidiaries and qualified distribution partners ensure proximity where ever you are. Since we are familiar with your requirements, we use our experience and knowledge to provide first-rate solutions.

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