

Efficient analysis with KJELDATHERM®, TURBOTHERM and VAPODEST®

# THE IDEAL KJELDAHL SYSTEM FOR ANY NEED



## SAFE

Reliable results and  
safe operation

## FLEXIBLE

Comprehensive  
accessories for all  
sample types and  
sizes

## EFFICIENT

Robust system and  
long service life

## TRANSPARENT

See what's happening.  
Visible analysis,  
traceable processes

“In 1883, Johan Kjeldahl presented his analytical method for determining nitrogen in organic substances to the public for the first time. As early as 1884, C. Gerhardt began building and selling the first digestion and distillation equipment using the Kjeldahl method.”



# NITROGEN AND PROTEIN ANALYSIS ACCORDING TO KJELDAHL

A high degree of precision and universality make the Kjeldahl method the world’s leading standard method for determining the nitrogen content in food and feedstuffs as well as in soil and water samples. It can be used flexibly and universally, including with inhomogeneous sample material, and always provides reliable results.

**THE FOUR STEPS  
OF THE ANALYSIS METHOD:**

1. Digestion of the samples with sulphuric acid
2. Distillation of the digestion solution with steam
3. Titration of the distillate
4. Calculating the result



# UNSURPASSED FLEXIBILITY

## LARGE SELECTION OF EQUIPMENT AND ACCESSORIES

The range of equipment and accessories from C. Gerhardt is uniquely varied and combinable. We offer different digestion and distillation systems, including the matching accessories, depending on the type and volume of samples you need to handle. The components of your Kjeldahl system are so easy to configure that they will fit perfectly into your everyday laboratory work. Simply select from our wide variety of infrared and block digestion units, with or without lift function, from various control systems, an impressive range of tube sizes and from our insert racks for different numbers of samples.

## DIGESTION UNITS

- Either...  
**KJELDATHERM®** – block heating system
- + ideal for large numbers of samples
  - + suitable for foaming samples with BS 400 ml tubes (e.g. milk or beer)
  - + convenient lift function for automatic lifting of 20 samples
  - + standardised conditions for digestion
  - + exact temperature/time control

- Or...  
**TURBOTHERM** – infrared heating system
- + quick heating and cooling of samples
  - + energy/time control
  - + suitable for large sample weights and volumes
  - + ideal for strongly foaming samples at high volumes (e.g. sewage or sludge)
  - + suitable for tubes with different volumes (100, 300, 400 or 800 ml)

Both heating systems can be ideally combined with the effective TURBOSOG gas scrubber for all digestion units.



For example KBL 20S TZ



For example TT 125



# STEAM DISTILLATION SYSTEMS

As soon as you switch on your VAPODEST®, it runs some self-diagnostic checks, including checking the steam generator water level, and heats up, giving you time for other tasks. The system continuously monitors the processes and notifies you when it is ready to use. Once ready, all you have to do is insert the sample tube and press start and the selected method is run automatically. Your presence is then no longer required until it is time to change the sample.

The VAPODEST® only switches on the cooling water when needed and, depending on the setting, starts the soft start steam input to prevent strong reactions. At the end of distillation, the apparatus automatically stops the steam input and cooling water supply and if left, switches to stand-by mode in order to save resources. All processes are monitored automatically. In special cases, the apparatus automatically switches to a safe mode and informs the user about which errors have been detected. This makes it easier to identify the cause. Documentation functions also stores information about the details of samples tested previously.

Depending on the configuration of the VAPODEST® model, various reagents are added automatically, residual solutions are automatically removed, while the titration, results calculation and sample change can be performed automatically.

OPERATIONAL COMFORT

### OVERVIEW OF VAPODEST® MODELS

- + VAPODEST® 200: manual sample dilution, manual filling of receiver, manual titration, manual removal of sample waste, manual calculation of result, manual sample change
- + VAPODEST® 300: manual filling of receiver, manual titration, manual calculation of result, manual sample change
- + VAPODEST® 400: manual titration, manual calculation of result, manual sample change
- + VAPODEST® 450: result can be calculated on computer via data export, manual sample change

For more information about our fully automated Kjeldahl systems, see the brochure "KJELDAHL DISTILLATION FULLY AUTOMATIC".

- + VAPODEST® 50s: fully automated, manual sample change
- + VAPODEST® 50s carousel: fully automated system for 20 samples



“GAFTA certification of our application laboratory is constantly renewed in tests every six months.”



# MAXIMUM ANALYSIS QUALITY

## THANKS TO AUTOMATION, STANDARDISATION AND TECHNICAL PRECISION

The validity and consistency of your measured results are your prime asset. To keep the results largely unaffected by external influences, we automate the digestion and analysis processes as far as possible. Tried and tested C. Gerhardt applications make your work easier when dealing with new analysis tasks, in addition to providing you with a reliable basis for the highest quality of analysis.

Our KJELDATHERM® block digestion units have a precise temperature control system. Heating times and temperatures are maintained exactly and monitored. In combination with the special C. Gerhardt Kjelcat catalyst, you can therefore achieve perfect digestion results that can be reproduced at any time.

Our VAPODEST® distillation systems provide documentation and operating functions based on the internationally applicable quality standard DIN EN ISO/IEC 17025 and GLP. Sturdy pumps control the addition of reagents with high precision. The steam can be regulated continuously from 10 to 100 percent, making it possible to perform special distillations. The unique, programmable “soft-start” function prevents strong reactions.

To continue to meet the strict quality requirements in the long term, we take part in ring tests of our equipment at regular intervals. GAFTA certification of our application laboratory is also constantly renewed in tests every six months.



# EFFICIENT PROTECTION

## UNCOMPROMISING SAFETY

Safety is the top priority when it comes to our equipment. For this reason, all our systems have comprehensive safety features. Here is a brief sample:



- KJELDATHERM®**
- + Safety window
  - + Efficient TURBOSOG extraction facility neutralises acid fumes (optional)
  - + Drip tray for acid
  - + Removalbe controller so that it can be kept outside a fume cupboard
  - + Overheating protection and overcurrent circuit breaker
  - + Optional: lift for automatic, convenient lifting of the samples out of the block in order to cool the samples



- TURBOTHERM**
- + Efficient TURBOSOG extraction facility neutralises acid fumes (optional)
  - + Secure hook-on insert rack for cooling the samples
  - + Special electrical protection
  - + Drip tray for acid
  - + Overcurrent circuit breaker
  - + Fast cooling down of heating elements



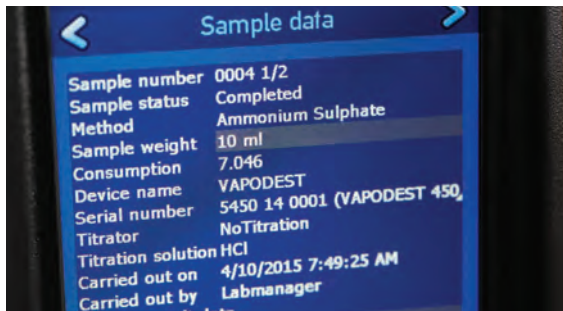
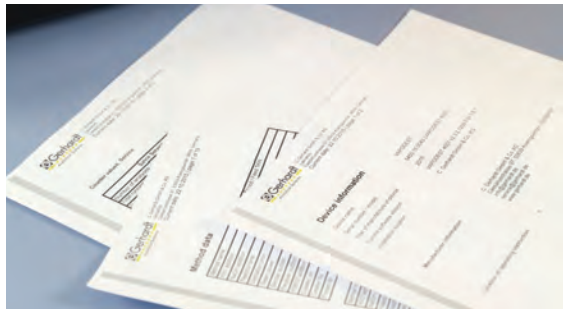
- VAPODEST®**
- + Transparent protection door: system can only be operated when door is closed
  - + Multiple safeguards on steam generator
  - + Special electronic protection SELV (Safety Extra Low Voltage)
  - + Self-diagnostic function: performance and function of all components are constantly monitored automatically
  - + Maintenance monitor
  - + Level sensors for commercially available chemical canisters avoid contact with chemicals (optional)





# TRANSPARENT PROCESS

REPRODUCIBLE AND TRACEABLE



Good news for accredited laboratories: C. Gerhardt has developed smart software that formats data from relevant VAPODEST® equipment, methods and samples to create documents that comply with ISO 17025.

Laboratories accredited in accordance with DIN EN ISO/IEC ISO 17025 have to meet strict requirements: transparent handling of data, data completeness and traceability of measurement results must be ensured and documented precisely. With VAPODEST®, you can manage your processes exactly as required by ISO 17025.

The ISOdoc-CREATOR software program developed by C. Gerhardt converts the data imported from the apparatus into documents that clearly map all the information required by ISO 17025 regarding the device, method data and sample data.

“ISOdoc-CREATOR creates ISO 17025-compliant documentation.”

# EFFICIENT AND POWERFUL

PREMIUM QUALITY THAT PAYS OFF



As the world’s leading Kjeldahl specialist with more than 130 years of experience, we develop equipment with the very latest in technology and design. Our equipment meets all the data management requirements for ISO 17025 accredited laboratories and are particularly cost-effective:

- ✦ Resource-saving: adjustable cooling water consumption
- ✦ Standby function: energy-saving and ready to start immediately
- ✦ Low operating costs thanks to long service life

- ✦ High quality of design and component selection ensures excellent system reliability
- ✦ Equipment can also record the data required for ISO 17025, if desired
- ✦ Smart function: choice between quick system start with preset method or start in accordance with ISO 17025 where all sample data is required.
- ✦ Efficiently insulated steam generator made of stainless steel ensures constant steam output with low energy consumption



The VAPODEST® series is available with different degrees of automation. From the simple smart version for small numbers of samples, to fully automated systems with integrated titration and autosampler for a high sample throughput. All VAPODESTS® are compatible with a wide variety of Kjeldahl digestion tubes and flasks.

For further data and order information, see the brochure “KJELDAHL DISTILLATION FULLY AUTOMATIC”.





# KJELDAHL ANALYSIS IN LINE WITH STANDARDS

C. Gerhardt analysis systems fulfil, as a minimum, the accuracy criteria specified for recovery and repeatability by official national and international standards. Here are a few examples:

- + ISO 937 Meat and meat products (Reference method)
- + AOAC 928.08/981.10 Meat
- + ISO 1871 Food and feed products (General guidelines)
- + GAFTA 130, 4:0 Feedingstuffs
- + ISO 5983-2 Animal feeding stuffs
- + AOAC 954.01 Animal feed and pet food
- + AOAC 2001.11 Animal feed, feeding stuffs (plant fibre), cereals and oilseeds
- + ISO 20483 Cereals and pulses
- + EC No. 152/2009 Methods of sampling and analysis for the official control of feed
- + ISO 8968-1 (IDF 20-1) Milk and dairy products
- + ISO 8968-3 (IDF 20-3) Determination of nitrogen in liquid milk
- + ISO 8968-4 (IDF 20-4) Determination of non-protein-nitrogen content
- + AOAC 991.20 Nitrogen (total) in milk – IDF-ISO-AOAC method
- + DIN 38406-5 German standard methods for the examination of water, waste water and sludge
- + AOAC 973.48 Water
- + EPA 351.3 Water
- + ASTM D3228 Lubricating oils and fuel oils

All systems are continuously tested and optimised in C. Gerhardt's GAFTA-certified laboratory in terms of precision, cost-effectiveness and safety. Regular successful involvement in ring tests such as GAFTA, FAPAS or VDLUFA, MUVA underline the capability of the equipment.



# COMPREHENSIVE RANGE OF ACCESSORIES

In addition to our analysis equipment, we offer a wide range of accessories and consumables. These were specifically developed and tested for use with our equipment and help ensure excellent analysis results.

## LARGE SELECTION OF SAMPLE TUBES

Different tube sizes and shapes can be used for every conceivable application, expanding the possibilities many times over.

- + Sample tubes: 250 ml, 400 ml, 800 ml and 1,200 ml
- + Micro digestion tubes: 100 ml
- + Kjeldahl flasks: 250 ml, 500 ml and 750 ml

## LEVEL CONTROL SENSORS FOR CANISTERS

Reliable level control sensors can be connected to VAPODEST® for automatic fill level monitoring of the canisters. When a specific fill level is reached, a corresponding message is shown on the display and the distillation is interrupted, if applicable.

- + Level control sensors for chemical tanks
- + Level control sensors for sample waste canisters

## KJELCAT CATALYST TABLETS

Highly effective catalyst tablets for a wide variety of applications. Perfectly coordinated for use with C. Gerhardt digestion units. Available in packaging units of 1,000 pieces.

- + KJELCAT catalyst tablets, e.g. type Se, Cu, CuTi or Cu light
- + Anti-foaming tablets for strongly foaming samples



KJELCAT catalysts and anti-foaming tablets



Digestion tubes and Kjeldahl flasks

“The variety of our accessories range is unsurpassed. We can satisfy any requirement.”

THE NEXT GENERATION

COMPARISON OF THE VAPODEST® SYSTEMS

Type	VAP 200	VAP 300	VAP 400	VAP 450 (without titrator)	VAP 450 (with titrator)
Programmable addition H <sub>3</sub> BO <sub>3</sub>			●	●	●
Programmable addition H <sub>2</sub> O		●	●	●	●
Programmable addition NaOH/reagent	●	●	●	●	●
Programmable reaction time	●	●	●	●	●
Programmable distillation time	●	●	●	●	●
Programmable steam power 10 - 100 %	●	●	●	●	●
Programmable suction of sample waste		●	●	●	●
Programmable suction of the receiver				●	●
Selection of language	●	●	●	●	●
Different user levels	●	●	●	●	●
Optical and acoustical error messages	●	●	●	●	●
Method data base	●	●	●	●	●
Programmable methods	●	●	●	●	●
Kjeldahl flasks can be used	●	●	●	●	●
Multi Touch Sensitive Screen 7"	●	●	●	●	●
Embedded PC with Micro controller	●	●	●	●	●
Connection of external CG titrator possible				prepared	●
Connection for level tank control	●	●	●	●	●
Connection for external keyboard and PC-mouse	●	●	●	●	●
USB interface	5 x	5 x	5 x	5 x	5 x
Ethernet interface	1 x	1 x	1 x	1 x	1 x
RS-232 interface	1 x	1 x	1 x	1 x	1 x

● = Standard configuration

ORDER DATA  
For detailed technical data and order information for the individual device types and for the accessories and consumables, please request our product data sheets for KJELDATHERM®/TURBOTHERM and VAPODEST®.



SERVICE AND MAINTENANCE

C. Gerhardt products are quality products for daily routine operation in the laboratory. We only use high quality materials with long service lives to provide you with maximum functionality and reliability.

Laboratory equipment is exposed to high load. Acid fumes, heat and high sample throughput leave traces on every device. As a result, hoses, seals, pumps and glass parts have to be checked and cleaned at regular intervals and replaced, if necessary.

A maintenance and service agreement from C. Gerhardt maintains the serviceability and reliability of your digestion and distillation equipment. Maintenance can also be performed in accordance with DIN 31051, if desired.

SCOPE OF MAINTENANCE FOR VAPODEST® (depending on apparatus type)

- General visual inspection and cleaning
- Replacement of steam and extraction hoses
- Cleaning the steam system
- Check of the pump delivery volumes
- Check/calibration of the autosampler
- Software update (if available)
- Complete functional test
- Analytical check with standard solution
- Electrical check according to VDE 0701
- Documentation of the work performed
- Issue of a test sticker

SCOPE OF MAINTENANCE FOR KJELDATHERM®/TURBOTHERM

- General visual inspection and cleaning
- Check of lift mechanism (if present)
- Visual inspection of heating elements (TURBOTHERM)
- Electrical check according to VDE 0701
- Documentation of the work performed
- Issue of a test sticker

OTHER SERVICES

- Repairs on-site or on the premises of C. Gerhardt
- Cost estimates
- Help by telephone or E-mail
- Individual solutions for your equipment pool

IQ/OQ/PQ QUALIFICATION

We also perform IQ/OQ/PQ in accordance with our manufacturer specifications for these products.

Our authorized C. Gerhardt Partner is happy to develop an individual maintenance and service contract with you for equipment from our company.





C. Gerhardt – Quality made in Germany

# AUTOMATING STANDARD ANALYSES

C. Gerhardt have developed highly specialised equipment for the complete automation of certain analyses. They automate recurring analysis processes in accordance with national and international standards and norms. They continuously provide precise and reproducible analysis results quickly, at low cost, economically and highly efficiently.

An excerpt from our product portfolio

- + COMPLETELY AUTOMATIC HYDROLYSIS**  
HYDROTHERM – automatic acid hydrolysis system for fat determination according to Weibull-Stoldt. When combined with SOXTHERM®, HYDROTHERM is an ideal system solution for total fat determination.
- + COMPLETELY AUTOMATIC FAT EXTRACTION**  
SOXTHERM® – automatic fast extraction system for fat determination
- + COMPLETELY AUTOMATIC NITROGEN ANALYSIS**  
DUMATHERM® – nitrogen/protein determination of solid and liquid samples according to the Dumas combustion method. A fast and convenient alternative to the classic Kjeldahl method for almost all sample matrices.
- + COMPLETELY AUTOMATIC CRUDE FIBRE EXTRACTION**  
FIBRETHERM® – completely automated processing of the boiling and filtration processes for determining crude fibre, ADF and NDF.



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