

Business Unit

Technology



Your partner of choice for complete solutions in the food and beverage industry



Business Line
Scientific Instrumentation

Think Asia. Think DKSH.

Business Unit Technology

DKSH is a leading provider of Market Expansion Services, proficient across various industries. As a total solution provider and system integrator, we serve our customers as a one-stop-shop and provide customized technology solutions. We do not only provide professional after-sales services, but also cover the entire product life cycle including installation and commissioning, final acceptance testing, production start-up support, training, maintenance, repair, spare parts and consumables supply as well as trade-ins. We operate as a trusted link between suppliers from Asia, Europe or America and customers in Asia, enabling suppliers to expand their markets.

Sales and services are our core competencies. Our sales, service and applications specialists are highly trained and dedicated to deliver complete, integrated laboratory solutions to our customers. Industry-specific expertise, in-depth process knowledge and complementary product-service portfolio enable us to stand out as a total solutions provider.

Business Line Scientific Instrumentation

Our Business Line Scientific Instrumentation provides Market Expansion Services for innovative manufacturers of high-end analytical and life science equipment. We supply a wide range of laboratory instruments, scientific equipment, life science products and consumables, to laboratories in the government, research, university, contract analysis and industrial sectors. We also provide applications support and service across all the sectors.

Your food quality and safety partner

Business Unit Technology provides a range of instruments and solutions to ensure customers can focus on their core business of manufacturing safe and high-quality food products.

Our scientific instruments do the rest for you, ensuring that you meet food safety quality, authenticity and adulteration requirements in your laboratories and manufacturing.

Our comprehensive range of instrumentation products and our highly skilled application and service support teams can assist you and your business with the following:

- Sample preparation
- Chemical characterization
- Physical characterization
- General laboratory equipment
- Water treatment solutions

We provide complete and integrated laboratory solutions to:

- Ensure consistency of incoming ingredients
- Support texture understanding and control
- Accelerate innovation and product development
- Predict shelf life
- Streamline quality control
- Reduce process downtime
- Optimize milling and granulation operations
- Improve manufacturing processes
- Increase productivity and yields
- Process water and reclaim, reuse effluent and sludge treatment as part of a comprehensive water treatment solutions

Market specific applications

With our profound market knowledge we, are best positioned to serve our customers regarding their needs. We provide products and services to the following industries across Singapore.

					
Aerospace	Automotive	Chemical and cosmetics	Dies and molds	Healthcare and hospitals	Metals, minerals and mining
					
Oil and gas, plastics and polymers	Pharmaceutical and biotechnology	Education and academics	Food and beverage	Semiconductor and electronics	Energy and environment

Food and beverage analysis

Ensuring food safety and quality

The analysis of food and food production processes is essential for quality management. Component analysis includes moisture, fat,

protein and specific elements (metals, nitrogen, etc.). For optimizing production and reducing production downtime, DKSH provides instruments and solutions along the entire

production process; from inspection of incoming materials to quality assurance and quality control of finished products. When thinking about food quality and safety, think DKSH.

DKSH – your partner for efficient production processes

Incoming material

Research and development

Quality assurance and quality control

Finished product



Enhance
Operational quality and productivity of the entire facility

Increase
Employee satisfaction and productivity

Reduce
Operational costs

Achieve
Continuous improvements

Meet
Regulatory compliance

Maximize
Your facility performance



Solutions for accurate answers every time

Sample preparation

Sample preparation is an essential part of laboratory processing and is often one of the most time consuming tasks. Be it heat treatment and particle size reduction of

food and beverages, water and gas production to supporting sample testing and fusion treatment of food samples, DKSH provides a comprehensive range of instruments for the

tasks. Regardless of your laboratory applications, we bring to you a variety of solutions that are efficient and reliable so you can focus on research and product development.

UHT/sterile treatment

Ultra-high temperature processing otherwise known as high temperature/short-time pasteurization is commonly used in

food applications, especially for dairy products, to kill off microorganisms for safer consumption and increased shelf life. With our range of equipment, everything from

sterilization to aseptic filling of sterile products is taken care of, effectively extending the shelf life of products.

Armfield Miniature Scale R&D Technology

- A miniature scale UHT processing system optimized for product development use. The system is highly flexible and has a wide range of options
- Touchscreen full control panel, with graphical display of temperatures and 32 storage memory presets
- Process temperatures up to 150 °C, with throughput rates up to 20 l/hr for product and 120 l/hr for CIP and pasteurization throughputs up to 50 l/h
- Rapid switch-over between pressed chevron plate heat exchanger and tubular heat exchanger, with two-stage cooling options
- Ease of installation in limited space with minimal product hold-up enabling smaller sample sizes



Armfield Aseptic Filler Sterile Filling System

- Small-scale, cost effective solution to producing sterile packaged samples with excellent shelf life
- Capable of filling wide-range of containers and producing sterile samples (when linked to a suitable UHT processing system). Can interface with existing Armfield UHT equipment
- Filling environment to federal standard 209E class 100 (i.e. meets microbiological safety and pharmaceutical production/ filling requirements)



Spray drying

Spray drying is a commonly used method of drying for thermally sensitive products in the food and beverage industry. The pro-

cess evaporates solvent, producing a finely dispersed powder from a fluid feed, with control over the particle properties such as density, size and moisture. This result in

uniform flow characteristics. The spray drying is particularly common for dairy products and flavor formulations.

Armfield Spray Dryer and Spray Chiller

- The Armfield Tall Form Spray Dryer and Spray Chiller have been purpose designed to allow laboratory quantities of products to be processed. Despite the small-scale of the equipment, the powders produced will be comparable to large-scale production dryer capability
- Systems offer unparalleled flexibility. Compact, mobile design, easily dismantled for inspection and cleaning purposes and data logging facilities for all key operating parameters
- Change from spray drying to spray chilling configurations in a matter of minutes thus adding further unique experimental capability
- Drying air temperature up to 250°C, with a maximum flow rate of 7 l/hr and maximum evaporation rate up to 3 l/hr
- Enhanced safety features including spark arrestors and a safety extraction fan



Carbonation

Carbonation is used widely in the food and beverage industry, usually for the preparation of carbonated beverages. With a laboratory scale combined carbonator and

filler, replicating production for research or small batch production is much more convenient. Furthermore, with a wide range of capabilities and options, a higher level of

customization is possible enabling more in-depth research into the impact of the process conditions on product characteristics for better product development.

Armfield Carbonator – Filler

- Reputed to be the best Carbonator-filler on the market
- Accurate control of filling and carbonating variables with option of filling and crown seal capping and/or screw top capping at single station
- Batch and continuous process possible, in 15L process vessel with throughput up to 60 l/hr achievable
- In bottle pressure measurement for accurate and reproducible depressurization
- Double stage cooling to prevent CO2 loss during filling



Deionized water production

Deionized water is a staple in almost every laboratory. A reliable source of demineralized (DI) water can go a long way in

streamlining your processes and increasing the cost-effectiveness of testing. With our demineralized (DI) water production systems, whether you prefer Type I, II or III, we

bring the perfect water solutions to your laboratory.

Membrapure Water Purification Systems

- Reliable and compact systems to produce ASTM Type I grade water from municipal or potable water (Aquinity² range) or de-ionized water (Astacus² range)
- New systems with compact housing and a large touchscreen interface for smooth operation
- Upgrades available for detection of trace substances for high water purity with up to 12 months of trackable water quality values
- Aquinity systems equipped with a reverse osmosis (RO) and/or an optional electro-deionization (EDI) cell to produce deionized water



ICP sample fusion

ICP analysis has been revolutionary in trace metal/compound detection, but the sample preparation methods for ICP have remained tedious. With sample fusion so-

lutions, you can not only reduce the time spent on preparation, but also improve the precision and accuracy to produce results with higher repeatability.

Claisse LeNeo Fluxer

- Fully automated instrument with ready to use ten preset fusion programs that ensure high fusion success rate to prepare glass disks or solution for XRF, AA and ICP analysis
- User-friendly touch screen interface feature allows the adjustment of all

settings and fusion parameters to prepare a wide range of materials (cement, steel, catalyst, refractories)

- Automated safety door locks to prevent operator contact with high heat
- Optional point: reduce corrosive chemical handling such as hydrogen fluoride



Gas generators

Almost every research laboratory requires a variety of gases, especially for analytical instruments such as the mass spectrometry machines. While gas cylinders seem like a

simple solution, they can give rise to a separate set of complications including high costs, safety risks and additional administrative work. With on-site gas generators,

customizable, reliable and continuous supply of gas using instruments is ensured to protect your testing and production needs.

Claind Nitrogen Generator

- Industrial gas generators for high purity nitrogen gas
- Oxygen analyzer included to keep nitrogen purity under control in real time – comes with custom nitrogen purity
- Generator enters automatic standby mode

for reduced energy consumption once production flow exceeds consumptions

- Generator able to work unattended and autonomously 24 hours a day, 365 days a year without requiring surveillance or programming



Claind Plug and Play Nitrogen Generator

- Plug and play nitrogen generator base on pressure swing absorption principle with Claind's patented "Fast Purity" Technology – the most efficient and robust system nowadays
- Standard production of 3.5 NL/min of nitrogen gas at 7 bar, requiring only one working day to produce the nitrogen contained in a cylinder

- System includes oil-free air compressor and air filtration system as well as basic or multi-channel mixer that when connected with CO2 cylinder can supply up to 5 different gases (pure N2, Pure CO2 and 3 mixtures of N2 + CO2)
- Nitrogen purity better than food grade E941
- 50 to 100 liter external tank for storage of nitrogen produced



Claind Analytical Gas Generators

- Comprising of hydrogen, nitrogen, zero air generators, as well as gas purifiers
- Flexible structures with independent modules to minimize footprint, allow for greater flexibility in placement
- Variety of applications including but not limited to gas chromatography, LC-MS,

TOC, ICP, ELSD, thermal analysis and, sample preparation

- Pressure Swing Adsorption for delivery of high purity nitrogen from compressed air in minimal time



Homogenizers/particle size reduction

Homogenizers are widely used in the food and beverage sector and are vital for improving the uniformity and stability of dispersions. By uniformly breaking down

particles, homogenizers can improve a variety of product characteristics ranging from taste, texture, to shelf life. With the variety of emulsions and dispersions the food and

beverage industry deals with, our range of instruments covers a variety of techniques and specifications to cater to your application needs.

Microfluidics LM20 High Shear Fluid Processor

- Converts pressure energy more efficiently into shear and impact forces, attaining targeted size reduction at lower peak pressure, which results in less sample temperature rise during processing
- Micro-channel architecture of each interaction chamber enables linear volumetric scale-up for larger capacity processing, guaranteeing process performance at pilot/production scales, and minimizing additional development time
- Product stream accelerates to high velocities, creating shear rates that are orders of magnitudes greater than any other conventional method
- Efficient nanoencapsulation masks objectionable smells and tastes of added nutrients, protects against oxidation to extend shelf life and enables time-release benefits
- Emulsion applications - achieve stable emulsions in submicron to nanometer range for optimized properties (e.g. taste, rheology)



Microfluidics Plug and Play Homogenizer

- Has been designed to reliably achieve continuous operating pressures up to 30,000 psi. This processor maximizes the energy-per-unit fluid volume, resulting in uniform submicron particles
- Capable of processing a wide-variety of fluids, including oil-in-water emulsions, solids-in-liquid suspensions and cell disruptions - of even the most difficult yeast and plant cells - in as few as one or two passes
- Recommended for stable nanodispersions, stable nanoemulsions, cell disruption, deagglomeration and microencapsulation in liposomes, polymers and oils



Microfluidics Low Volume Homogenizer

- Designed to bring scalable high shear fluid processing to samples as small as 1ml
- Operates at shear rates up to 12.25 million/sec with near-total sample recovery for sample sizes from 1-6 ml
- Recommended for nanoencapsulations, nanoemulsions, nanosuspensions, deagglomeration and cell disruptions



Hielscher UIP100hdT Versatile Homogenizer

- Wide range of homogenizers (50 to 400W) for homogenization of samples in beakers, test tubes, or vials
- Provides exact reproducibility and linear scalability of the obtained results from bench-top to full production levels as no driving parameters are changed during scale-up
- Requires little maintenance, easy is to setup and simple to clean and sanitize
- Overall energy efficiency 80-90% from the power plug into the liquid; capable of 24/7 operation under high load



Hielscher Ultrasonic Laboratory Devices

- Ultrasonic preparation devices for the purpose of homogenizing, cell extracting, degassing, hot water disinfection, disintegrating, deagglomerating and sonochemistry
- High flexibility leading to high adaptability to process requirements
- Sonotrodes constructed of titanium alloy, allowing high amplitudes and rendering the sonotrode resistant to most chemicals
- Ultrasonic amplitude is adjustable from 20 through 100%. Alternatively to continuous operation, a cycle of intense sonication bursts can be adjusted



Temperature equipment

Temperature control can be essential for research and production processes, especially in the food industry when dealing

with highly temperature-sensitive compounds such as enzymes. Besides maintaining constant temperatures, active heating or cooling can also accelerate production

processes. With DKSH's range of instruments, improvement can be achieved with lower cost and energy expenditure.

Lauda Temperature Equipment

- Laboratory thermostats, water baths, and chillers with a wide range of applications ranging from preparation of biological and pharmaceutical samples to temperature control tasks in process reactors
- Able to provide a temperature constancy of up to ± 0.005 °C across a wide temperature range of -150 to 400 °C, depending on the type of heat transfer liquid



Chemical characterization

The chemical characterization of complete products and raw materials is essential for enhanced understanding of formulation behavior, in turn improving and broaden-

ing product development capabilities. With the wide range of instruments DKSH offers, you can obtain a better understand-

ing of the composition and behavior of the formulation as well as raw materials used for processing.

Particle imaging analysis

Particle characteristics play a significant part in directing the final product characteristics of food products. With the highly competitive landscape in the industry, a consistently high product quality is an important means of product differentiation.

An accurate, repeatable method of measurement is vital for a better understanding of particle character and behavior. Particle size and shape distribution can influence particular behavior such as the packing of particles and ultimately impact the bulk density of the material. With particle char-

acteristics in formulations ultimately affecting the taste, texture and shelf life of food, a deep understanding of particular character is essential in research studies. With our range of instruments, we provide you with the tools so you can focus on product development and quality control.

Malvern Morphologi G3-ID Particle size analyzer

- The Morphologi G3-ID brings a significant additional capability to the Morphologi range of instruments - the ability to provide chemical identification of individual particles using Raman spectroscopy
- Measures particle size, shape and chemical identity in one platform - particles sizes from 1 μm to 10,000 μm
- Fully automated Raman chemical classification of thousands of particles
- Integrated dry powder dispersion option
- Simple SOP operation from sample dispersion through size, shape and chemical analysis
- Powerful additional capability, ideal for R&D



Chromatography/sample preparation

By controlling the molecular properties of components, formulators often desire to manipulate the properties of the bulk solution. To understand and manipulate a sample's bulk properties, formulators first

measure and study the molecular properties and distributions. For example, the variations in molecular weight, size, branching and intrinsic viscosity of polysaccharides can greatly impact the final product performance in terms of texture, taste and even

shelf life. With our range of chromatography systems and accessories, we assist you in finding the right technology for you to optimize your formulation for the desired product properties.

Malvern Viscotek GPC/SEC Range and Multi-detector

- Analysis of molecular weight, molecular weight distribution, molecular size and structure of proteins and synthetic and natural polymers
- Absolute molecular weight of small polymers, protein stability and protein aggregation using Right Angle Light Scattering (RALS)
- Direct output of absolute molecular weight of polymers without extrapolation using Low Angle Light Scattering (LALS)
- Copolymer composition using photodiode array UV detector
- Advanced GPC/SEC software capable of going from data to results in just two clicks

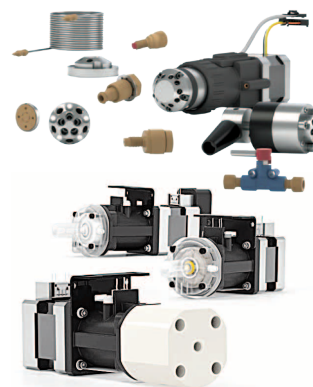


IDEX Chromatography Accessories

- Superior chromatographic column hardware, ranging from adaptors, tubing assemblies, injection loops, probes and sleeves. Also available are filters, frits, adaptors and back pressure regulators as well as vacuum degassers for solvent preparation before chromatography
- Variety of pumps, valves and fluid control devices available for fluid manipulation. Manifolds and specialized tubing/fitting

components also available for system integration with the real world, in a variety of materials

- Feature specialty high-performance polymers and a variety of materials, including high pressure and fluoropolymer tubing. Also available in unique material formats such as biocompatible PEEK-lined stainless steel tubing



Leco Gas Chromatography Coupled with Mass Spectrometer

- The Pegasus HT GC-TOFMS system combines GC-TOFMS technology with advanced ChromaTOF software to provide an unparalleled increase in laboratory productivity
- Full-mass range spectral acquisition rates of up to 500 spectra/second allow for significant reduction in chromatographic analysis time. Dynamic Signal Tracking (DST) further enhances Pegasus HT's

dynamic range, spectral integrity and overall system robustness

- Exclusive automated data processing capabilities minimize tedious manual manipulations and enhance data quality
- Completely automated qualitative sample characterization, and quantitative analysis and/or inter-sample measurements can be completed in a fraction of the time required by manually-oriented processing systems



Postnova Multi Flow FFF Universal Separator

- Most advanced FFF platform for separation of proteins, macromolecules, and nanoparticles
- Based on the Flow FFF principle, uses a crossflow field as a driving force for the separation. Samples affected by this field are separated by their Dynamic Diffusion

on the basis of their molar mass or particle size

- Is completely integrated by the NovaFFF single software platform which runs the entire system from autosampler to detectors
- High flexibility as a Universal Separator for many kinds of analyte systems



Skyray Liquid Chromatography

- Liquid chromatography system with excellent performance indices and high stability to enable easy and flexible analysis using a high performance pump coupled with a highly sensitive detector

- Wavelength range of 190-680 nm, with an indicated value error of less than 1 nm and wavelength repetitiveness better than 0.1 nm
- Enhanced sensitivity due to 23.8% improvement in signal to noise ratio



Skyray Gas Chromatography

- Multi-functional, easy-to-use, remote-controllable gas chromatograph for superior performance
- Large column oven to allow simultaneous accommodation of capillary and double-packed columns

- Option for up to three kinds of detectors - Flame Ionization, Thermo Conductivity, and Electron Capture Detectors
- High detector sensitivities, with sensitivity up to 5000 mV.mL/mg for TCD



Water analyzers

The food and beverage industry generally registers high levels of water usage. With such high consumption, any degradation in water quality can lead to high costs in terms of both wastage and quality issues.

Membrapure TOC Analyzer

- Wide range of products for TOC analysis of different water qualities from ultrapure water in the pharmaceutical industry and in power plants to waste water from the production sites
- UV radiation is used as the oxidation method to guarantee high precision of

Proper monitoring of water quality is essential for the prevention of material wastage and with our range of online and offline Total Organic Carbon (TOC) analyzers, the total organic carbon content in production water can be continuously monitored

- the measured values, using either conductivity measurement or NDIR detection for TOC determination
- Designed for monitoring of process water as well as production of potable and ultrapure water

ensuring quality issues are identified and addressed immediately. Similarly, proper monitoring of water quality in the laboratory is essential to ensure effective testing and quality control.



Elemental analyzers

A highly competitive landscape combined with stringent safety and quality regulations have made quality control increasingly important in the food and beverage industry. Ensuring the quality of raw ma-

terials is key to maintaining final product quality. Protein content in foodstuff is often a key parameter of the nutritional value and quality of samples. Especially in the case of dairy or meat products, a small difference in protein content can indicate

a marked difference in quality. Accurate measurement of protein is thus essential for both product development and quality control. With DKSH's range of instruments, we bring to you systems for rapid, hassle-free measurement of protein content.

Leco Nitrogen/Protein Analyzer

- Rapid analysis time of 3.5 minutes for nitrogen/protein results in organic matrices
- Low cost per analysis with increased instrument uptime for maximum throughput due to extended reagent lifetimes

- Inclusion of pre-chiller block and thermoelectric cooler to eliminate the need for chemical reagents for moisture removal from furnace combustion gases



Leco TruMac Series Macro Determinator

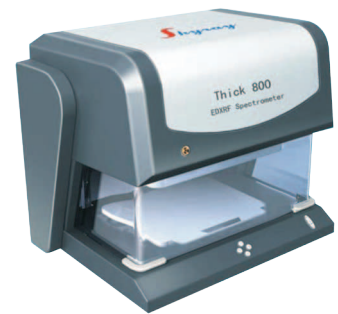
- Easily determine nitrogen/protein or carbon/nitrogen in characteristically heterogeneous, difficult to prepare, or low-level samples. Nitrogen sample mass up to 3g or carbon/nitrogen samples up to 1g can be analyzed in as little as 5 minutes, with a low cost-per-analysis. Ideal for soils, feeds, meats, pet foods, starches, slurries, or wastewater
- Easily handles characteristically

- heterogeneous, low-level, or difficult to prepare samples
- Autoloader for sequential and non-sequential analysis of up to 50 pre-weighed samples
- Rugged design for improved reliability and minimal maintenance
- Supports compliance with AOAC, AACC, AOCS and ASBC methods of analysis



Skyray Elemental Analyzers

- Elemental analysis using a variety of techniques including XRF, MS, ICP, AAS, AFS, or OES
- Easy to use, high accuracy instruments that can identify up to 80 elements
- Wide range of instruments that can easily measure and analyze hard to reach surfaces



Amino acid analyzer

Amino acids are the building blocks of protein and vital parameters for food analysis. Analyzing the amino acid content of a sam-

ple provides information on the nutritional value of food, indicates spoilage, contamination and can also be used for quality inspection purposes. Our range of analyzers

give you a competitive edge by enabling a precise and direct measurement of the protein composition of even your most complex samples.

Biochrom 30+ Amino Acid Analyzer

- Designed for the analysis of complex oxidized hydrolysates such as those obtained from food and feedstuff
- Able to indicate origin and type of protein source and detect spoilage or microbial contamination
- Useful for monitoring production processes, quality control and providing proof of nutritional quality and data for nutritional labeling in beverages, food and feedstuff



Physical characterization

Physical characterization of formulations is essential to product development, no matter if it is with solids, liquids, emulsions or gels. A number of characteristics such as

particle shape and size, dispersion stability and surface tension are directly related to the final taste, texture, and shelf life of food and beverages. With DKSH's wide range of

physical characterization instruments, we can help you find the right solution for your formulation research and product needs.

Dispersion stability analysis

Dispersions are of varying nature and complexity, but commonly found in many food samples. Understand the character of dispersions can be difficult, especially

for sample stability as well as the particle sizes in the sample. The stability of dispersions is highly important in the food and beverage industry as stability is directly re-

lated to shelf life. DKSH makes the study of dispersion simpler with instruments that measure stability directly for the entire, undiluted sample.

LUM LUMiSizer

- Quick characterization of any demixing phenomena and consolidation and calculation of the velocity distribution in the centrifugal field as well as of particle size distribution
- Run up to twelve samples simultaneously
- Accelerated phase separation 6-2300 times compared to gravity
- Particle size distribution 20 nm - 100 μm
- Observation time is 1s to 99 hours



LUM LUMiFuge

- Objective classification and quantification of demixing phenomena, with easy and fast determination of stability and shelf-life of dispersions
- Run up to eight samples simultaneously
- Accelerated phase separation 6 to 2300 times compared to gravity
- Measures concentrated dispersions and sediments
- Dispersion stability analysis reduced to less than 24 hours and observation time is 1s to 99 hours



LUM LUMiReader

- Specially designed PSA module for high resolution particle sizing and to allow measurement of the velocity distribution of separating particles without a need to know any material constants (i.e. velocity, density)
- Contains an optical block and temperature control element for maximum flexibility and accuracy
- Accelerated phase separation 10 times compared to gravity
- Particle size distribution 500 nm – 300 μm
- Observation time from 0.5 s and above



LUM LUMiReader X-ray

- Designed to study dispersibility, stability, separation and consolidation phenomena for completely transparent to completely opaque emulsions, suspensions, sludges, slurries, foams and powders in real time
- No dilution required, regardless of concentration level
- Determine concentration gradients within phases and sediment
- Determine mean and space resolved packing densities



Particle size analysis

Characterization of formulations is essential to product development. Particle size can have a significant impact on the final product characteristics such as the spread-

ability, texture, adhesive properties and ultimately taste. Particle size is also an important parameter in testing the uniformity and stability of materials. With a wide range of instruments available, it is signifi-

cantly easier to obtain accurate, repeatable readings for particle size and distributions to optimize your formulation for the finest product quality.

Malvern Mastersizer Range

- Highest data quality on every sample
- Particle size measurement of a broad range of sizes - from 10 nm to 3.5 mm, and excellent sub-micron resolution with rapid measurement time
- Provides an accurate, reproducible measurement for materials with broad particle size distributions
- Single dashboard interface that allows real-time optimization of each measurement, with edit-in-place report designer for customized data handling
- Samples can be presented as wet dispersions or dry powders



Malvern Zetasizer Range

- Particle size - NIBS technology enables measurement of particles and molecules from 0.3 nm to 10 microns
- Zeta potential - M3-PALS technology enables accurate measurements of zeta potential in aqueous and non-aqueous dispersions
- Molecular weight – An avalanche-photodiode detector and fiber detection optics give the sensitivity and stability required for absolute molecular weight measurement



Malvern Insittec Online Process Analyzer

- Laser diffraction technique with a size range 0.1 μm to 1000 μm
- Patented high concentration sizing with correction for multiple scattering to deliver accurate, concentration-independent result
- Measurement of spray particle and spray droplet size distributions in real-time for more efficient product development of sprays and aerosols
- First principles measurement using Mie theory and needing no calibration



Malvern Spraytec Aerosol/Droplet Analyzer

- Accurate particle size over an extremely wide 0.1 - 2000 microns range using just 2 lens systems
- Rapid measurements at acquisition rates of up to 10kHz capture the dynamics of any spray process in exceptional details
- A patented multiple scattering analysis ensures accurate measurements can be made at high concentrations
- Automated software and advanced analysis features ensure repeatable aerosol measurements can be made at high spray concentrations



Rheology analysis

Rheology is an important concept in the food industry where products are required to display varying consistencies and flow characteristics based on their final application. While characteristics such as texture and spreadability of final products are dif-

ficult to measure, the rheology of formulations can be measured with relative ease using specific analytical instruments. Understanding the impact of various factors such as temperature, shear, or agitation on formulation behavior is important for optimizing products including taste, texture

and appearance. With DKSH's range of rheometers, regardless of your application, you can study your formulation behavior in detail, optimize your product and maintain optimal quality.

Malvern Research Grade Rheometer Kinexus Range

- Next generation rheometer redefines ease of use
- Unique rSpace software provides a user interface that offers total flexibility of test set-up for research and development
- Analyzes the rheology, flow and deformation properties of food materials
- Time and cost savings by reducing reliance on sensory testing and manual analysis
- Unique feature of solvent trap for preventing the sample from drying out quickly



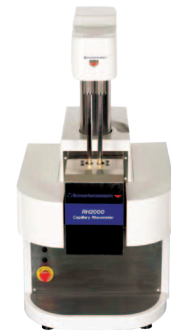
Malvern Rosand Capillary Rheometer RH7/10

- Characterize rheology of materials by extrusion under high pressures and shear rates, under temperatures ranging from 5 to 500 °C allowing test correlation with real material processing conditions
- High force range (up to 100kN) and wide dynamic speed range (>225,000:1) allow test correlation with real material processing condition
- Twin bore barrels as standard enable absolute shear viscosity measurements and simultaneous calculation of extensional (elongational) viscosity
- Range of optional barrel sizes and barrel materials to permit measurement of thermally-sensitive, chemically-aggressive or aqueous-based samples
- Wide range of high precision tungsten carbide dies as standard to cover all material and test types



Malvern Rosand Capillary Rheometer RH2000

- Characterize rheology of materials by extrusion under high pressures and shear rates, under temperatures ranging from 5 to 500 °C allowing test correlation with real material processing conditions
- Maximum drive force (up to 20 kN) and maximum speed (up to 1200 mm/min) capabilities enable wide range of shear rates
- Rosand twin bore principle for direct measurement of die inlet pressure and determination of absolute viscosity
- Rigid one-beam cantilever frame design provides extreme mechanical strength and stiffness for compact bench-top unit
- Unique swivel head design gives easy access for sample loading and instrument cleaning



FungiLab Rotational Viscometer

- Fast and accurate measurement of fluid viscosity, using a unique glass ball technology
- 18 different speeds between 0.3-100 r.p.m available
- Variety of measuring ranges to choose from, starting from 1 to 106,000,000 cP
- Precision up to ±1% of full scale, with a repeatability within 0.2%



Density meter

Density is a commonly measured parameter in the food and beverage industry, used for quality inspection of both raw materials and final products. Density measure-

ment allows a better understanding of the content in various food and drink samples, such as the extract and alcohol content in wine, dry matter content in dairy, carbohydrate, fat and protein content in generic

food samples. Depending on the application, we offer a variety of density meter models to suit your specific application needs.

Rudolph Research Analytical Density Meters

- Automation Flexibility – Combine density, polarimeter and refractometer for simultaneous measurement
- High Resolution VideoView™ for on-screen bubbles detection with 10x magnification for easy measurement
- Offers density accuracy to 0.00005 g/cm³
- Direct and accurate means of °Brix determination, °Plato, °Balling, % Solids



Optical property analysis

Refractometers are essential tools for the quality measurement of food and beverages. By measuring the refractive properties, that is amount of light bent as it passes through a known sample, you can

identify pure substances, estimate the concentration of various components such as sucrose, salt, or protein in the sample and determine the uniformity of compounded products. Similarly, polarimetry or optical rotation, a property unique to the medium

through which light is passed, can be used to determine the purity of raw materials, or for quality control of blended materials. With DKSH's range of instruments, we can provide solutions for optical analysis to improve your quality control processes.

Rudolph Research Analytical Refractometers

- Very fast measuring refractometer for the sugar, food and beverage industries, perfect for high throughput applications where temperature correction and a highly durable bench-top refractometer are required
- Shallow sample well for easier cleaning so as to reduce the problem of cross contamination between samples for accurate measurements
- Offers a sapphire prism for high mechanical and chemical durability



Rudolph Research Analytical Polarimeter

- Designed for today's FDA regulated analytical laboratories with electronic cooling and heating from 15 °C to 45 °C
- Comes with six standard wavelengths: 365 nm, 405 nm, 436 nm, 546 nm, 589 nm and 633 nm
- 21CFR Part 11 Compliance: Electronic signature and secure local data storage



Rudolph Research Analytical Saccharimeter

- Developed and tested in conjunction with labs testing pharmaceutical grade sugars requiring precise temperature control with flow through cell type operation
- Ability to measure at two wavelengths: 589 nm and 880 nm in the NIR region
- Temperature with automatic temperature correction. Models available with TempTrol system for push-button temperature control with a system that accurately controls sample temperature within ±0.2 °C
- Quick and simple calibration



Vapor sorption analysis

Vapor sorption analysis is essential to study the solvent absorbance characteristics of various materials. Not only is this characterization important for formulation devel-

opment, it is often vital for the development of appropriate packaging. Ensuring minimal diffusion of moisture or vapors through packaging is essential to maximize shelf life of products and minimize mould

growth or contact with toxic substances. With vapor sorption analytics, a better understanding of stability and shelf life will further enhance your product development capabilities.

Surface Measurement Systems Vapor Sorption Analyzer

- World leaders in water/vapor sorption (humidity) technology - water sorption properties of solids are critical factors in determining solid storage, stability, processing and application performance
- Accurate determination of sorption behavior using small samples down to 10 mg
- Capable of measuring changes in sample mass lower than 1 part in 10 million
- Measures hygroscopicity of granules and powdered beverages, powdered milk formulation, spray-dried seasoning, water adsorption of dehydrated food



Surface Measurement Systems Vacuum Vapor/Gas Sorption Analyzer

- Capable of precise gravimetric measurement of gas and vapor adsorption and desorption under dynamic/static, isothermal, or isobaric conditions
- Used to routinely measure carbon dioxide, sulfur dioxide and ethanol/water sorption in zinc based MOFs, silica dioxide and zeolites



Surface energy analysis

Surface energy profiling is essential for a clear understanding of particle behavior. Understanding particle behavior and especially its interactions with substances is essential for the optimization of formulation

for the required application. For example, the final performance and stability of food materials is highly dependent on the water uptake of the food samples as well as the packaging materials. Water sorption

isotherms and similar information obtained from the iGC-SEA systems can provide adequate insight into these material properties and enhance research and production techniques.

Surface Measurement Systems Inverse Gas Chromatography - Surface Energy Analyzer

- The world's only commercial instrument based on IGC principle, providing a wide range of injection concentrations with unparalleled accuracy and reproducibility
- Uses a gas phase technique for characterizing surface and bulk properties of powders, particulates, fibers, films and semi-solids
- Fully automated system that can be operated at different solvent vapor, flow rate, temperature, humidity and column conditions
- Surface energy values (dispersive and polar) correlate to several key solid properties including wetting, dispersability, powder flowability, agglomeration, process-induced disorder, adhesion/cohesion, static charge, adsorption capacity and surface chemistry



Compound analyzer

Quality verification often requires contact techniques which contaminate samples, rendering them unusable. While elemental analysis is more common, verification may include protein, mineral, or even nutrient

identification. DKSH range of identification tools facilitate the measurement of a variety of compounds with options for non-destructive testing to minimize product discarded or lost while ensuring pro-

duction remains on specification. Similarly, qualitative evaluations of raw products are made easier for better process control and enhanced research into alternative feeds.

ASD NIR Spectrometer

- NIR analyzers for rapid, non-destructive, precise measurements in industrial environments
- Process spectrometer ideal for continuous measurement of solids, powders and blended materials transported on conveyor systems

- Portable version delivering full-range spectral measurement available for field data collection



ASD Field Spectoradiometer

- Field spectoradiometers that deliver the fastest and most accurate spectral field measurements available from any commercial field-portable spectoradiometer
- Rapid, non-destructive measurement to predict quality properties and acts as

- batch control for raw materials or end products within tolerance specs
- Ensures out-of-spec ingredients are discarded ahead of production line to cut down on waste and time
- Detect color homogeneity of food products



Bacterial and allergen detection

Surface and equipment cleanliness plays an essential role in preventing food contamination. For this purpose, bacterial testing on food samples alone provides insufficient

information on contamination. Petrifilm tests allow for rapid checking of bacterial and pathogenic contamination in food samples, providing a faster and more hassle-free means of quality checking. Mean-

while, the Clean Trace kit provides further clarification by testing production and laboratory surfaces, allowing you to zero down on the exact source of contaminant.

3M CleanTrace Luminometer

- Rapid monitoring of surface and food/ beverage cleanliness with high result accuracy
- Comprehensive software for data logging, for enhanced monitoring and process improvement implementations

- ATP based testing with simple liquid enzyme for objective indication of cleanliness
- Reduce risk of cross contamination, while demonstrating due diligence



3M Petrifilm

- Rapid testing for bacteria and pathogen with no hassle of agar plate preparation
- Simple and rapid result processing to allow effective, continuous monitoring

- In-house testing for better control over production line and easier identification by area in case of contamination



General laboratory equipment

With our range of general laboratory equipment, we make your everyday laboratory tasks more efficient and accurate so you can focus on the scientific techniques

of research and product development to lift your products to new heights. From measurement purposes, mixing and centrifugation, to storage over a variety of tempera-

tures, our range of equipment serves your every need.

Laboratory tools and equipment

A variety of tools are required for routine laboratory tasks such as measuring, heating, cooling and storing. While your application criteria vary based on the

physical and chemical state of your samples, we offer solutions for every requirements. From balances, micropipettes to ovens, incubators and freezers, we provide you with equipment to ensure the

fundamentals are taken care of, so you can focus on the finer, complex techniques of product development and processing.

LabPRO Analytical Balance

- Quick and accurate ease of operations; Precise measurements with up to 0.1mg readability
- Stable readings of measurement up to +/- 0.0001 (S.D) (mm) repeatability
- Dynamic temperature compensation accounts for changes in environment for accurate weighing
- Large backlit LCD screen for easy reading



LabPRO Micropipette

- Micropipette models for a range of volumes from 0.2 µl to 10000 µl designed for maximum accuracy and precision
- Completely autoclavable to ensure minimal sample contamination in tightly regulated environments
- Universal tip cone design for compatibility with major brands of micropipette tips



LabPRO Bottletop Dispenser

- Bottletop dispenser models for a range of volumes from 0.25 to 100 ml, designed for high chemical compatibility and smooth movement
- Designed with a recirculation valve for bubble free dispensing without any loss of reagent
- Adjustable dispensing nozzles with adaptors for fitting on a range of regular laboratory reagent bottles



Daihan Centrifuge

- Quiet operation with a high maximum speed of 13500 rpm
- Acceleration and braking times < 15 seconds at maximum rotation speed
- cGMP certified for use in pharmaceutical laboratories indicating high quality maintenance in production environment



Daihan Autoclave

- Digital, fuzzy-control autoclave in a simpler and more ergonomic design
- Unique and innovative Electronic Safety Door Locking system and Steam Condensing Mechanism for enhanced user safety
- Option for operation between liquid and solid cycle mode, with faster temperature decrease and steam release in solid cycle mode as opposed to liquid cycle mode



Daihan Incubator

- Wide range of incubators ranging from force and gravitation convection, low temperature, multi-room and shaking incubators
- Outfitted with high performance heating mechanism that is optimized respectively for capacity of chamber, power of heating element and air circulation type
- High stability of chamber temperature, with minimal fluctuation leading to high degree of temperature accuracy and uniformity within chamber



Hermle Centrifuge

- Small, universal laboratory centrifuge covering wide range of research applications
- Wide assortment of rotor options from swing out, micro, to high volume angled rotors, exchangeable within seconds
- Refrigeration system on back side of unit



Freeze drying

Achieve efficient dehydration of your food samples under aseptic conditions to maximize hygiene without compromising the taste and appearance of your products.

With a wide range of freeze drying solutions, we cater to all your needs ranging from gastronomic research to continuous production needs.

Telstar Laboratory Freeze Dryer

- Specially designed for R&D phase freeze drying requirements - available range from small table-top units to sophisticated pilot equipment
- State-of-the-art control system with a range of specially designed accessories
- Flexible usage with options for adapter manifolds and for connection of different types of chambers



Refrigerator freezers

Reliable freezing solutions are of utmost importance for smooth functioning of your laboratory and production. Whether you need to store food samples at ultra low

temperatures or need to store flammable, explosive chemicals, we offer reliable solutions from industry leaders.

Telstar Low Temperature Freezer

- Laboratory freezers with stainless steel interior and exterior
- Models with varied temperature range from -18 to -35 °C
- Automatic defrost cycle and melt water evaporation in heated tray
- 60 mm of non-CFC, foamed polyurethane insulation



Kirsch Explosion Proof Freezer and Fridge

- Laboratory freezers and refrigerators with explosion-proof interior, built according to the 94/9/EC (ATEX 95) directive
- Intrinsically safe supply of all electronic components and structural safety for all non-electrical components
- Available in numerous volumetric capacities with temperature ranges within 2 to 20 °C (for refrigerators) and -25 to -5 °C or -22 to -15 °C (for freezers)



Daihan Freezer

- Digital laboratory freezer with CFC-free refrigeration and fast-freezing system
- Temperature range from -35 to 10 °C with digital fuzzy control system
- Corrosion resistant 304 stainless steel chamber and shelves to ensure safety and prevent sample contamination



Comprehensive water solutions for your product safety

Our water solutions and technology focus on engineering design, project management and execution of construction projects for water and wastewater applications. We provide the food and beverage industry with comprehensive water treatment solutions from process water, reclaim and reuse to effluent and sludge treatment.

Your purified water is much more than a waste product – it is also a recyclable resource. Water scarcity and conservation of water resources influence your production and effluent treatment costs. Our water solutions help you save water and energy costs.



Water is the first ingredient and the first effluent

Removes suspended solids, colloids, organics, iron and manganese from water (surface water, boreholes, lakes, river, groundwater)	Produces high quality demineralized water to the boiler and cooling water	Produces high quality process water	Treats wastewater for recycling process (cooling towers, boilers and other applications)	Treats wastewater including sludge concentration
Raw and industrial water	Boiler feed and cooling tower	Process water	Water recycling	Wastewater treatment
<ul style="list-style-type: none"> Filtration (multimedia, carbon, Hydrotech™ disc filters, ultrafiltration) Actiflo™ clarification 	<ul style="list-style-type: none"> Reverse osmosis (Multipure™ RO range) Ion exchange (Rapide Strata™, deionizers) Softening (Selectron™, Mid & High range) Hydrex™ water specialty chemicals 	<ul style="list-style-type: none"> Ultrafiltration/ microfiltration Reverse osmosis (Multipure™ RO range) Ion exchange (electro deionization) Disinfection Package solutions 	<ul style="list-style-type: none"> Sand filtration Activated carbon filtration Suspended solid removal (hydrotech, drum-filters, disc-filters, sand filtration) prior to raw and industrial water pre-treatment 	<ul style="list-style-type: none"> Flotation, Idraflot™ Membrane bioreactor, Biosep™ Activated Sludge MBBR Anaerobic treatment, Biothane™ Clarification, Actiflo™ Sludge treatment Evaporation and concentration, Evalue™

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