

**DEPARTMENT OF PROCESS
ENGINEERING**

R&D&I equipment

1. Labotron 500 microwave-vacuum drying cabinet

Technical specification and characteristics:

Convective, microwave and microwave-vacuum operation mode. Microwave operation with continuously and pulsed irradiation at two power level (250 and 500W). Maximum temperature for continuously convective drying is 120°C. Controllable vacuum with minimum value of 10 mbar.

Application field:

Examination of drying kinetic for continuously or pulsed microwave drying, vacuum and convective drying.

Person in charge:

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2. Teledyne Tekmar total organic carbon analyser

Technical specification and characteristics:

Total organic carbon (TOC) measurement in the range of 5-1000 ppm, total nitrogen content analysis in the range of 5-500 ppm, NDIR detector, software controlled intelligent dilution, autosampler; method according to EPA 515.1, 415.3, 9060A; and ISO 8245 standards.

Application field:

Total organic carbon (TOC) and total carbon (TC) measurement from water, wastewater and other liquid samples.

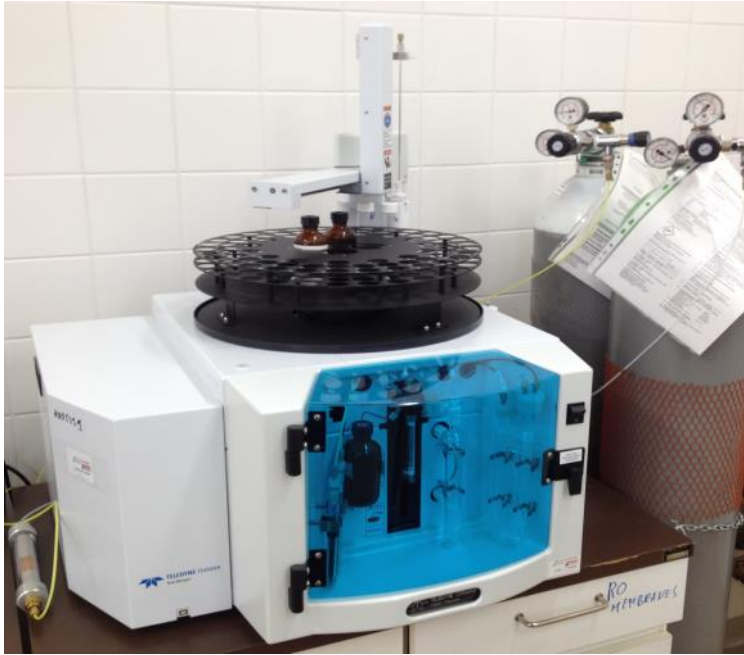
Person in charge:

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3. Eralytic Eraflash portable automated flashpoint tester

Technical specification and characteristics:

Automatic temperature control and electric ignition, closed cup flashpoint measurement in a temperature range of 0-200°C with temperature stability of $\pm 0,2^{\circ}\text{C}$, according to ASTM D6450 & D7094 methods.

Application field:

Flashpoint measurement of oil, solvents, biofuels, and liquid or solid samples

Person in charge:

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4. Infors Minifors fermentation system

Technical specification and characteristics:

Continuously stirred aerobic/anaerobic bioreactor with 2.5 L volume, automatic and temperature (range of 20-60°C) and pH control.

Application field:

Investigate aerobic/anaerobic biodegradation and kinetic on enzymatic processes.

Person in charge:

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5. Armfield UOP20 modular evaporation system

Technical specification and characteristics:

Double or single effect rising and/or falling film moduls with surface area of 0.0256m², minimum achievable pressure of evaporator is 100 mbar, steam heated jacket for evaporator unit, water cooled condenser, maximum capacity of 15 L/hrs, software temperature control.

Application field:

Continuously flow concentration of heat resistant material by vacuum evaporation, investigation of evaporation process parameters.

Person in charge:

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6. Armfield UOP8 tray dryer

Technical specification and characteristics:

Heater power adjustable up to 2 kW, fan adjustable to achieve air velocities of 0.3-1.8 m/s in the tunnel, air velocity, wet bulb and dry bulb temperature measurement before and after the drying material, maximum tray capacity of 3 kg.

Application field:

Drying of food industry and other raw materials, investigation of the effect of process parameters on drying kinetic.

Person in charge:

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7. Armfield W8 anaerobic digester

Technical specification and characteristics:

Two 5 litre upward flow packed bed reactors, temperature control in the range of 20-55°C, gas collector vessel for the reactors, variable feed rate with maximum of 7L/day by peristaltic pump.

Application field:

Investigation of anaerobic digestibility and biogas yield of liquid wastes, wastewater and sludge.

Person in charge:

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8. Continuously flow microwave system

Technical specification and characteristics:

Variable volumetric flow rate of 5-25 L/hrs, continuously variable microwave power of 100-850 W, water cooled magnetron operating at 2450 MHz, DAQ for temperature and dual channel (incident, reflected) power meter.

Application field:

Continuously flow treatment of liquids and sludge, investigation of thermal and energetic efficiency of microwave treatment.

Person in charge:

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9. Airtox portable biogas analyser

Technical specification and characteristics:

Measurement of the main components of biogas and landfill gas, measuring range: CO₂ (0.1-50 vol.%), CH₄ (0.1-100 vol.%), O₂ (0.1-25 vol. %) and H₂S (0-200ppm), automatic calibration.

Application field:

Analysis of the main components of biogas and landfill gas, capability for laboratory experiments and on site measurements.

Person in charge:

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10. Dani Master gas chromatograph

Technical specification and characteristics:

Modular gas chromatograph, digital and software control of operation, flame ionization detector (FID), analytical capillar column, manual injector.

Application field:

Quantitative analysis of volatile components.

Person in charge:

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11. Lovibond COD photometer

Technical specification and characteristics:

Chemical oxygen demand (COD) analysis determined by dicromate method in the range of 0-15000 mg/L.

Application field:

Determination of COD correlated with organic matter content of water and wastewater.

Person in charge:

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12. Lovibond Oxidirect BOD meter

Technical specification and characteristics:

Respirometric measurement of biochemical oxygen demand (BOD) for 1-28 day, measurement range of 0-4000 mg/L, continuously stirred thermostated system.

Application field:

Determination of BOD correlated with aerobic biodegradable organic matter content of water and wastewater.

Person in charge:

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13. VSEP (LP) membrane device

Technical specification and characteristics:

The microfiltration, ultrafiltration, nanofiltration and reverse osmosis membrane fouling can be effectively decreased by the membrane module operating on different amplitude vibrations ($A_{\max}=2.54$ cm). Further adjustable parameters: temperature (20-60 °C), recirculation flow rate (7.5-22.5 LPM) and transmembrane pressure (0.1-3 MPa).

Application field:

In food industry fruit juice concentration, whey protein separation, in water- and waste water purification: organic content, ions effective retentions.

Person in charge:

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14. Ceramic microfiltration (MF/K1) equipment

Technical specification and characteristics:

The ceramic microfiltration device has 0.2 and 0.4 μm pore size tubular membranes with 19 individual membranes. Since the ceramic membranes can easily tolerate wide pH and temperature range the microfiltration and the cleaning procedures can be effectively carried out at high temperature.

Application field:

In food industry the equipment can be used for wine clarification, separation of suspended particles, for the investigation of the membrane fouling mechanisms at high temperature and wide pH range. The biggest advantage of the device is the easy-cleanability.

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15. PCI (NF and RO) membrane filtration device

Technical specification and characteristics:

The tubular membrane module with polymer membranes (PCI: Paterson Candy International) can be used for nanofiltration (NF) and reverse osmosis (RO) membrane filtration scopes with high retention values.

Application field:

In food industry the equipment can be used for fruit juice concentration, in water- and waste water treatment for effective decreasing of organic content, furthermore to reject the monovalent and divalent ions.

Person in charge:

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16. *WPA Biowave II UV/Vis spectrophotometer*

Technical specification and characteristics:

UV/Vis spectrophotometer equipped with xenon lamp, which can be used in the 190-1100 nm wavelength range (with max 1 cm quartz, glass and plastic cuvettes).

Application field:

Measuring the absorbance of solutions and gases (in wide wavelength range, with 1 nm precision) for the determination of the concentration of given components, and measuring whole UV/VIS absorbance spectra.

Person in charge:

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17. *Wilks InfraCal TOG/TPH oil analyzer*

Technical specification and characteristics:

Equipment for the determination of hexane extractable hydrocarbon content

Application field:

The device can be applied for the quantitative analysis of hydrocarbon of Hexan-extracted wastewater and soil samples.

Person in charge:

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18. *OCA 15PRO* Contact angle meter

Technical specification and characteristics:

Equipment for the measurement of the hydrophilicity of max 10×10 cm (membrane)surfaces.

Application field:

The equipment is able to characterize the contact angle and the surface tension of clean and fouled membrane surfaces and to measure the surface tension of the feed with special high resolution camera.

Person in charge:

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19. Stirred *Millipore* micro- and ultrafiltration reactors

Technical specification and characteristics:

Batch-stirred *Millipore XFUF07601* membrane reactor (filtration area: 0.00332 m²).

Application field:

Batch-stirred, heatable membrane filtration reactor (equipped with sheet membranes) which can be combined either with ultrasonication or UV irradiation

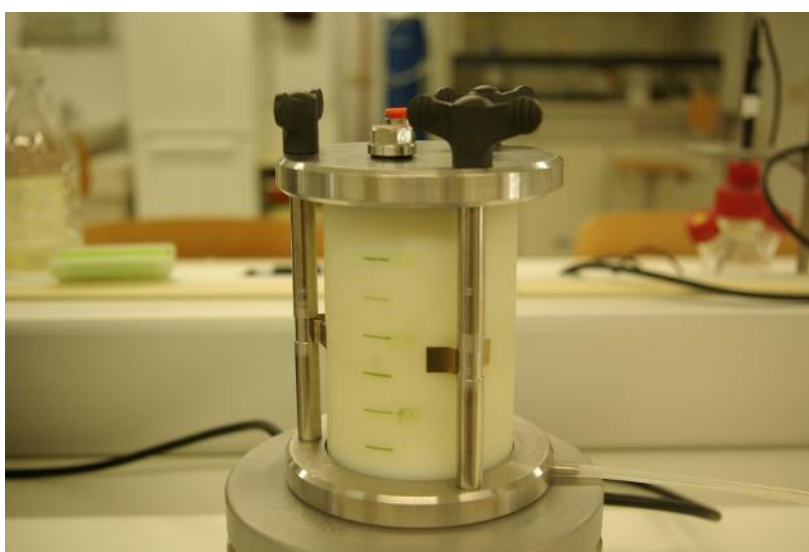
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20. Hunter Labscan laboratory spectrophotometer

Characteristics:

The instrument comprises an optical sensor and a processor. The processor is an IBM personal computer with a colour measurement and analysis software. The sensor measures the spectrum from 400 to 700nm of the diffused light reflected from samples and sends information to the computer for calculation the colour coordinates. The software reports the absolute colour coordinates, indices and colour difference data in six used colour scales, for 4 various CIE lighting and observing conditions.

Application field:

This instrument is suitable for measurement of colour coordinates and colour differences of powders, granules, mashes (ground paprika, durum semolina, cocoa powder, ground coffee, egg powders, concentrated tomato) and meat, cured meat products. It can be used in the lab for colour analysis of raw materials and food products.

Person in charge: Dr. Zsuzsanna Hovorka-Horváth, PhD, associate professor horvatzs[at]mk.u-szeged.hu



21. Dielectric measurement system

Characteristics:

Measurement of dielectric constant and dielectric loss factor for liquid and solid samples in the frequency range of 200-3000 MHz by SPEAG DAK 3.5 open ended coaxial dielectric probe.

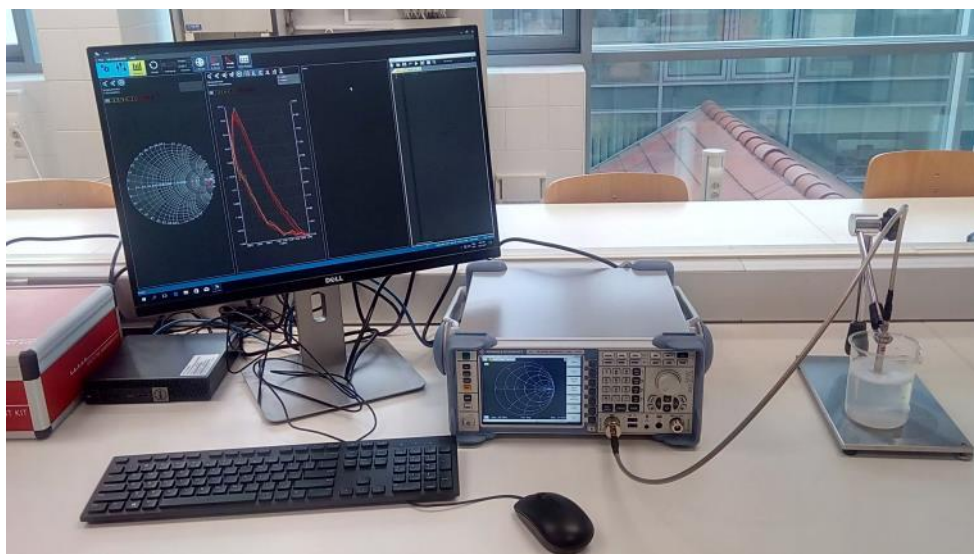
Application field:

Determination of dielectric constant and dielectric loss factor for food industry raw materials and products, waste and by-products. Detection of physicochemical changes by dielectric parameters during material processing.

Person in charge:

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22. Armfield HT12C – radial heat conduction

Characteristics:

http://discoverarmfield.com/media/transfer/doc/ht10xc_os.doc

Application field:

Educational measurement equipment.

Person in charge:

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23. Armfield HT14C – combined convection and radiation

Characteristics:

http://discoverarmfield.com/media/transfer/doc/ht10xc_os.doc

Application field:

Educational measurement equipment.

Person in charge:

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24. Armfield HT14C – expansion processes of ideal gases

Characteristics:

<http://discoverarmfield.com/media/transfer/doc/th5.pdf>

Application field:

Educational measurement equipment.

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