

New Products 2010



Instruments and Applications

Metrohm ...

02

- is the market leader in titration
- is the only company to offer a complete range of ion analysis equipment – titration, voltammetry and ion chromatography – under one roof
- is a Swiss company and manufactures exclusively in Switzerland
- supports you with unparalleled application expertise
- provides you with over 1300 applications free of charge
- is known for its competent support and reliable service
- is not listed on the stock exchange but owned by a foundation; the corporate management gives the interests of customers and staff priority over maximizing profit

Dear Metrohm Customer,

This booklet gives you an overview of Metrohm's portfolio for 2010. Discover new instruments and application solutions, developed for you and your particular industry.

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Our regional sales managers are happy to provide you with more detailed information, and our product and application specialists enjoy sharing their expertise with you.

Yours sincerely,

Metrohm

Intelligent Titration

04



The new Titrando generation with 900 Touch Control

- Intelligent titration
- Automatic electrode test
- Favorites for direct method access

Even more functionality – *tiamo*™ 2.2 software

- Integration of 859 Titratherm (thermometric titration)
- Parallel titration: new «Release»-command enables using sample changers and Dosinos at two different workstations.
- Optimized database function enables the search and finding of data from specific determinations within seconds

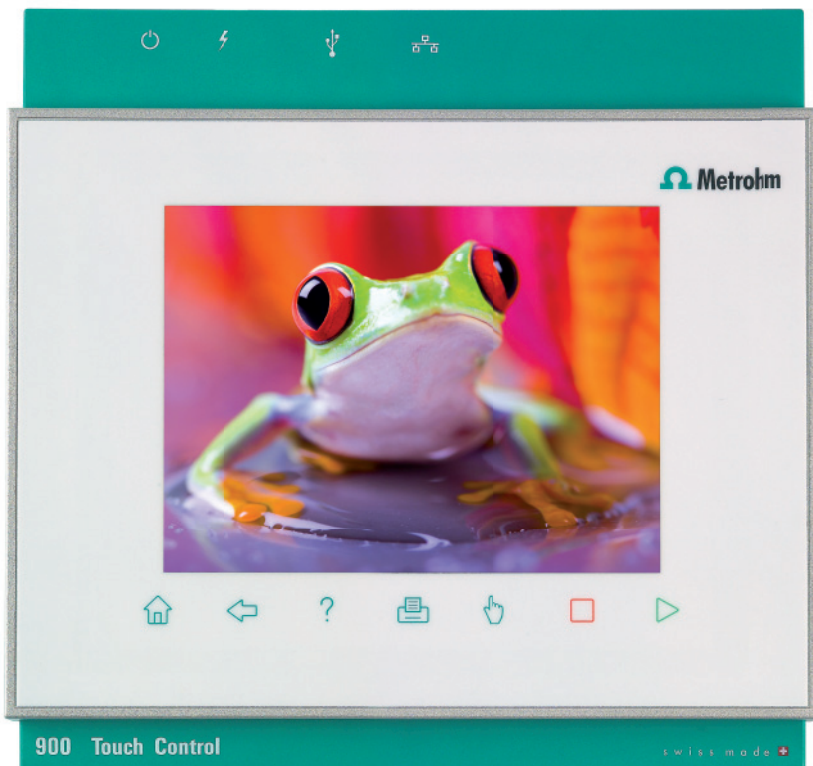


Touch-and-go Titration

05

900 Touch Control – never was titration easier

- Powerful as a PC: direct access to Ethernet and LIMS, data backup on network drives or external hard disk, access to network printers, PDF generator, USB interface, ...
- Smaller than a netbook: just 19 by 18 cm
- Brilliant color touch screen: 16 million colors
- Multilingual dialogue: now also available in Chinese and other languages
- Complies with FDA regulation Title 21 CFR Part 11



Karl Fischer Titration

06

851/852 Titrande – coulometric and volumetric KF titration

- Coulometry and volumetry with one instrument
(measuring range 0.0001% to 100% water)
- Bromine index
- Simply add sample, the determination starts automatically

874 Oven Sample Processor – automated thermal sample preparation

- USB oven sample changer for KF titrators
- Accommodates a variety of vessels – use vials best suited to your application
- Temperature gradient for determining the optimum oven temperature



Outstanding Automation



862 Compact Titrator

- Titrating sample changer, very cost-effective and extremely compact
- Dialog in English, German, Spanish, French and many other languages
- Very easy to operate at routine user level (expert level optional)



07

848 Titrino plus – easy, safe, precise

- Intelligent exchange unit with monitoring of titrant
- Operation and data export with *tiBase*
- Automation with the 869 Compact Sample Changer



Professional Ion Chromatography

08

889 IC Sample Center

- Autosampler for samples as small as 1 μL
- Cooling function
- Robust, flexible and fast sample delivery



872 Liquid Handling Extension Module

- More flexibility for the configuration of your 850 Professional IC system
- Enables installation of an additional analysis channel

891 Professional Analog Out

- Data recording by the lab software of your choice
- Up to four data channels (conductivity, flow, pressure, gradient profiles, temperature, ...) can be transmitted
- Use the software of your choice to monitor, process, store and reprocess any chromatographic parameters

A new Dimension of Separation Columns

09



2 mm columns

- High capacity anion exchange column with Metrosep A Supp 16 (100, 150 and 250 mm length)
- Increased detection sensitivity
- Less eluent consumption → less effort for preparing and disposing of solutions

Metrohm Suppressor Module – Low Capacity «MSM-LC»

- Chemical anion suppressor optimized for 2 mm columns
- Miniaturization of the analytical system
- 10 year warranty

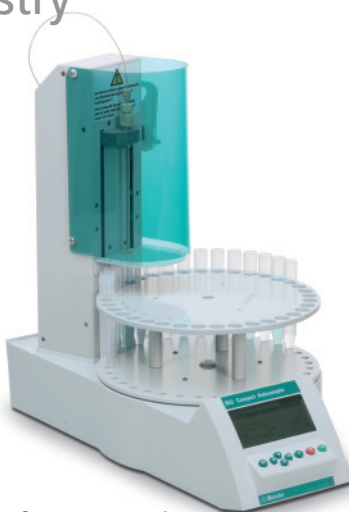
MagIC Net™ 2.1

- Latest version of Metrohm's intelligent ion chromatography software
- Integrates Metrohm's latest generation of IC systems
- Simple and intuitive operation
- Available in many different languages

MagIC Net

Electrochemistry

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797 VA Computrace – the all-around instrument for trace analysis

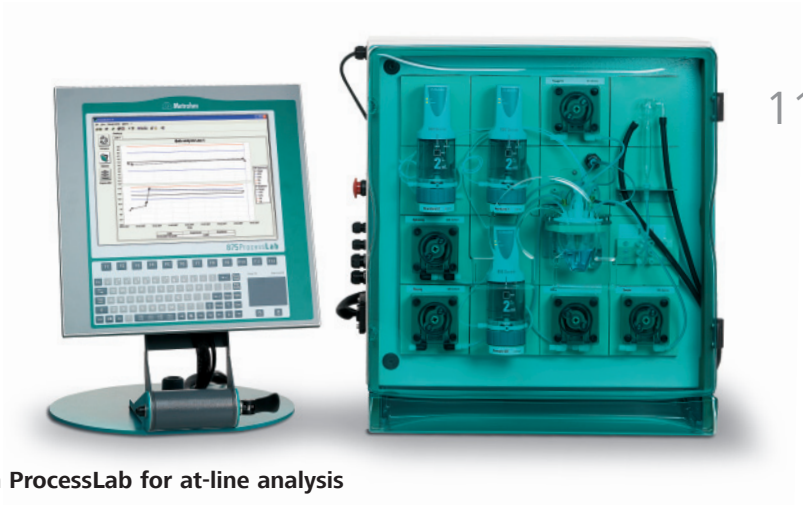
- Outstanding sensitivity and selectivity
- Affordable automation with the 863 Compact VA Autosampler
- The ideal complement to AAS, ICP and ICP-MS

Autolab PGSTAT 302N

- All electrochemical measurement techniques
- Batteries, fuel cells, sensors, corrosion
- Freely programmable Nova software, automation



Process and Environmental Analysis



Metrohm ProcessLab for at-line analysis

- Easy operation
- Rugged hardware
- Networking and process integration
- Now also available as MiniLab for the on site lab

MARGA: compact system for analyzing gases and aerosols

- **M**onitoring of organic components in **AeRols** and associated components in the **GA**s phase of ambient air
- Sampling and ion chromatography system integrated
- Also available as a **PILS** (**P**article **I**nto **L**iquid **S**ampler) for laboratory analysis




General Chemistry

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| Application Examples | Titration | Ion Chromatography | Electrochemistry | Process Analysis |
|--|-----------|--------------------|------------------|------------------|
| Anions in acids, bases and brines | | | | |
| Chromate in textiles and leather | | | | |
| Alkali and carbonate in brines (e.g. chlor-alkali electrolysis) | | | | |
| Isocyanate, acid, amine, epoxide and saponification index/number | | | | |
| Water content in solvents, lacquers and dyes | | | | |
| Anions in ionic liquids | | | | |
| Cadmium, cobalt and lead in concentrated zinc sulfate solutions | | | | |
| Nickel in 50% sodium hydroxide solution | | | | |
| Quality Control of fine chemicals | | | | |
| Lead in electroless nickel baths | | | | |
| Surfactant content of detergents and cleaning baths | | | | |

Pharmaceutical


| <div>Application Examples</div>  | Titration | Ion Chromatography | Electrochemistry | Process Analysis |
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| Enzyme activity (e.g. lipase, amylase) | | | | |
| Water content (e.g. in tablets, capsules, ingredients) | | | | |
| Acid-base titrations (aqueous, non-aqueous) | | | | |
| Anions (e.g. F^- , Cl^- , NO_2^- , NO_3^- , SO_4^{2-} , PO_4^{3-}) | | | | |
| Cations ((e.g. Li^+ , Na^+ , K^+ , NH_4^+ , Mg^{2+} , Ca^{2+}) | | | | |
| Carbohydrates (e.g. mono-, di-, and polysaccharides) | | | | |
| Cystine, cysteine | | | | |
| Anions in infusion solutions | | | | |
| Chloride in different matrices | | | | |
| Fe(II) in injection solutions | | | | |
| Ascorbic acid in vitamin tablets | | | | |

Water and Air Monitoring

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| Application Examples | Titration | Ion Chromatography | Electrochemistry | Process Analysis |
|---|-----------|--------------------|------------------|------------------|
| Bromate in drinking water | | | | |
| Anions and cations in drinking water and wastewater | | | | |
| Chloride, bromide and sulfate in seawater | | | | |
| Norm compliant determination of the p and m value (fully automatic) | | | | |
| Fully automatic analysis of drinking water combining titration and ionchromatography (TitrIC) | | | | |
| CSB value in wastewater (fully automatic) | | | | |
| Chloride and sulfate in various types of dust | | | | |
| Chromium in wastewater | | | | |
| Uranium(VI) traces in drinking and mineral water (DIN 38406-17) | | | | |
| Calcium and Magnesium in drinking water | | | | |
| Cadmium and lead in ultra trace levels in river and sea water | | | | |
| Gases and aerosols in ambient air | | | | |

Metal and Electronics

| <div>Application Examples</div>  | Titration | Ion Chromatography | Electrochemistry | Process Analysis |
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| Trace amounts of anions and cations | | | | |
| Chloride, sulfate and borate in galvanic nickel baths | | | | |
| Sulfate in chromic acid | | | | |
| Hydrofluoric acid/nitric acid mixtures in etching and pickling baths | | | | |
| Hydrogen peroxide in etching baths | | | | |
| Lead in electroless nickel baths | | | | |
| Ni, Cu, Zn, Cr, Sn, Ag, Au, Al with acid and alkali in electroplating, etching and degreasing baths | | | | |
| Zinc, lead, nickel in zinc phosphating baths | | | | |
| Water in hydrofluoric acid and wafer coatings | | | | |
| Brighteners, suppressors, levelers in acidic copper baths | | | | |
| Sulfite and sulfate in gold electroplating baths | | | | |


Automobil Construction / Petrochemistry

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| Application Examples | | Titration | Ion Chromatography | Electrochemistry | Process Analysis |
|---|--|-----------|--------------------|------------------|------------------|
| | | | | | |
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| Anions in fuels | | | | | |
| Amines, organic acid and sulfur compounds in process water | | | | | |
| Anions in cooling liquids | | | | | |
| Chloride in brake fluids | | | | | |
| TAN/TBN and neutralization number in petroleum products | | | | | |
| Free and total acid, accelerator, zinc and fluoride in zinc phosphating baths | | | | | |
| Water content of oils and fuels | | | | | |
| Quality control of biofuels | | | | | |
| Elementary sulfur in gasoline | | | | | |
| Preparation of standards with defined octane or cetane number | | | | | |
| Chloride and sulfate in bioethanol | | | | | |

Biofuels

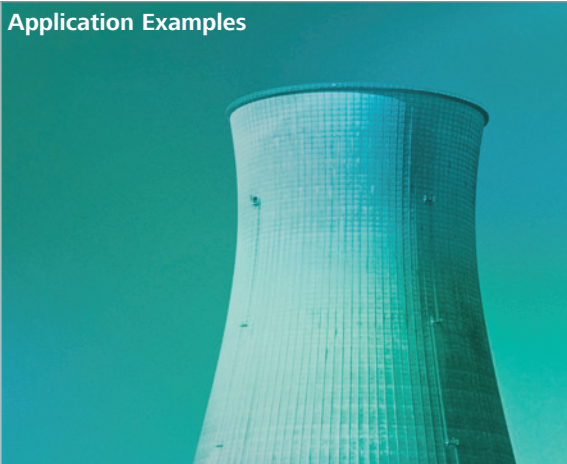
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|  Applikationsbeispiele | Titration | Ion Chromatography | Elektrochemie | Process Analysis | Stability Measurement |
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| Volumetric determination of the water content of Bioethanol in accordance with ASTM E 203 | | | | | |
| Coulometric water determination in biofuels in accordance with EN 12937, EN 15489 and ASTM E 1064 | | | | | |
| Chloride (ASTM D 512, EN 15484) _{pot} and sulfate (ASTM D 7318) _{pot} in bioethanol (ASTM 7319, 7328 and EN 15492) _{ic} | | | | | |
| Determination of the oxidation stability of biodiesel using the Rancimat method in accordance with EN 14112 and EN 15751 | | | | | |
| Determination of copper in an ethanol-gasoline mixture by anodic stripping voltammetry | | | | | |
| Determination of the total acid number (TAN) in biodiesel | | | | | |
| Determination of Li, Na, NH ₄ ⁺ , K, Ca and Mg in ethanol by cation chromatography | | | | | |
| pH (ASTM D 6423, EN 15490) and conductivity determination (DIN 51627-4) in bioethanol | | | | | |
| Determination of the iodine value of biofuels in accordance with EN 14111 | | | | | |
| Anions in a gasoline-bioethanol mixture determined by inline matrix elimination | | | | | |
| Determination of the glycerol content of biodiesel by electrochemical detection in accordance with ASTM D XXXX*. | | | | | |

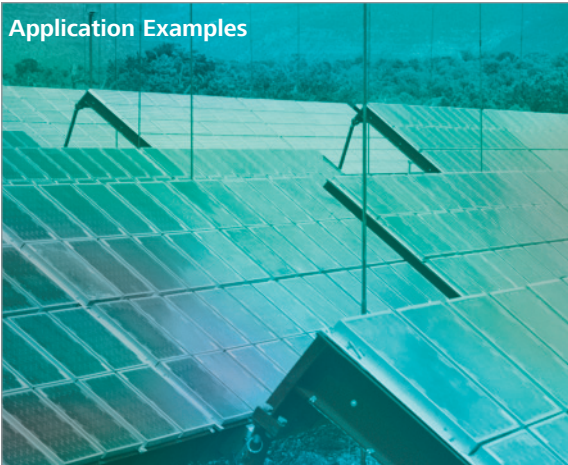
*Designation not yet known

Energy / Power Plants

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|  Application Examples | Titration | Ion Chromatography | Electrochemistry | Process Analysis |
|---|------------------|---------------------------|-------------------------|-------------------------|
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| Anions in the primary circuit of nuclear power plants | | | | |
| Cations in the secondary circuit of nuclear power plants | | | | |
| Fully automated determination of boric acid in power plants | | | | |
| FOS/TAC determination in liquid manure or silage (biogas analysis) | | | | |
| Organic acids in liquid manure or silage (biogas analysis) | | | | |
| Mineral acids and silicon in solar cell production | | | | |
| Water in transformer oils | | | | |
| Anions in wastewater of flue gas desulfurizing plants | | | | |
| Hardness of cooling water in nuclear power plants | | | | |
| Chloride in ash of flue gas desulfurizing plants | | | | |
| Fuel cell research | | | | |

Solar Technology

| <div>Application Examples</div>  | Titration | Ion Chromatography | Electrochemistry | Process Analysis |
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| Determination of hydrogen fluoride, nitric acid and hexafluorosilicic acid in etching baths | | | | |
| Determination of fluorosilicate and other acids in etching baths | | | | |
| Characterization of dye-sensitized solar cells and organic solar cells | | | | |
| Monitoring of baths for thin layer solar cells (CIS/CIGS cells) | | | | |
| Determination of additives in electroplating baths for the production of silicon solar cells | | | | |
| Determination of copper and chromium in etching baths | | | | |
| Determination of fluoride, nitrate, phosphate and sulfate in an etching agent using anion chromatography | | | | |
| Determination of phosphoric, nitric and acetic acid blends used for etching of aluminium in the production of semiconductors | | | | |


Plastics

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| Application Examples | Titration | Ion Chromatography | Electrochemistry | Process Analysis |
|--|-----------|--------------------|------------------|------------------|
| Antimony, cobalt and titanium in PET | | | | |
| Water in plastic granules | | | | |
| Phosphate and sulfate in polymers after inline dilution and inline dialysis | | | | |
| Fluoride, chloride, nitrite, nitrate, benzoate and sulfate in PVC | | | | |
| Acid and hydroxyl number, isocyanate in raw materials | | | | |
| Thermal stability of PVC | | | | |
| Carboxyl and amino end groups in polyesters and polyamides | | | | |
| 4-Carboxybenzaldehyde in terephthalic acid | | | | |
| Epoxide number of plastics | | | | |
| Free styrene in polystyrene | | | | |
| Nickel, cobalt, iron, chromium, manganese and titanium in polyterephthalate solution | | | | |

Biochemistry / Medical Technology


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| <div>Application Examples</div>  | Titration | Ion Chromatography | Electrochemistry | Process Analysis |
|--|-----------|--------------------|------------------|------------------|
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| Platinum in urine | | | | |
| Sodium, potassium and calcium in an infusion solution containing amino acids | | | | |
| Acid/base titration of blood and blood plasma according to Joergensen and Stirum | | | | |
| Determination of Riboflavins (vitamin B ₂), Thiamine (vitamin B ₁) and folic acid (vitamin B ₉ , vitamin B _c) | | | | |
| Simultaneous determination of cystine and cysteine | | | | |
| Determination of chloride, nitrite, nitrate, phosphate, sulfate and thiocyanate in saliva | | | | |
| Determination of ammonium using the ion selective electrode | | | | |
| Determination of the depolymerise activity – enzymatic degradation of bio plastic | | | | |
| Glycerolphosphate in amino acids | | | | |
| Determination of sodium, ammonium, potassium, calcium and magnesium in human urine | | | | |
| Aluminum in proteinlypohillisate after digestion | | | | |

| Application Examples | | | | |
|--|-----------|--------------------|------------------|------------------|
| | Titration | Ion Chromatography | Electrochemistry | Process Analysis |
| Salt and acid content of different foods | | | | |
| Organic acids in wine and beer | | | | |
| Formol number and acid content of juices | | | | |
| Vitamin C in baby food | | | | |
| Water content of chocolate | | | | |
| Acid number, iodine number, peroxide number, neutralization number in edible oils and fats | | | | |
| Zinc, lead, copper and iron in sugar | | | | |
| Degree of acidity in milk and yogurt | | | | |
| Cystine and cysteine in dairy products | | | | |
| Bromate in mineral water | | | | |
| Acetate, chloride and sulfate in mayonnaise | | | | |
| Carbohydrates in animal feed | | | | |

Training and Research

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| Application Examples |  | | |
|------------------------------------|---|--------------------|------------------|
| | Titration | Ion Chromatography | Electrochemistry |
| Basics of titration | ■ | | |
| Basics of Karl Fischer titration | ■ | | |
| Basics of ion chromatography | | ■ | |
| Basics of polarography/voltammetry | | | ■ |
| Corrosion studies | | | ■ |
| Batteries and solar cells | | | ■ |
| Materials research | ■ | | ■ |
| Electrochemistry | | | ■ |
| Nanotechnology | | | ■ |
| Sensor development | | | ■ |

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