UV-1700 UVmini-1240 AA-6300 with GFA-EX7i

Perfect for complex drinking water analysis: UV-VIS and AAS systems

Determination of hazardous substances

UV-VIS spectrophotometers such as the UVmini-1240 and UV-1700 are widely used for the determination of essential parameters such as the alkaline and alkaline earth elements as well as hazardous substances, e.g. hexavalent chromium which is applicable when testing for residual chromium in drinking water in mass concentrations between 2 µg/L and 50 µg/L.

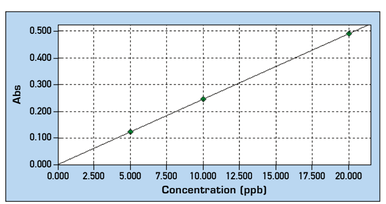
The spectrophotometers operate in conjunction with reagent tests and include photometric mode, spectrum scan and quantitative analysis. In addition, the UV-1700 features multi wavelengths and multi component measurements and more. Important for the QC laboratory are the instrument validation functions.

A typical application for AAS

The maximum allowable level for lead in drinking water has been reduced from 40 µg/L down to 10 µg/L.

This is a typical application for atomic absorption spectrometry in electrothermal atomization using a graphite furnace with digital control, such as GFA-EX7i.

The system configuration with double beam, double detector optics is designed for fully automatic multi element sequences with excellent long time stability. Accurate results are guaranteed using 2 background compensation techniques, built in as a standard for more than 70 elements in flame and furnace atomization.



Calibration curve for Pb in the range from 5 to 20 µg/L (ppb)

Element	Pb	Cu	Ni
Wavelength [nm]	283.3	324.8	232.0
Slitwidth [nm]	0.7	0.7	0.2
Atomization	Graphite furnance	Flame	Graphite furnance
Lampcurrent D_2 BGC*[mA]	10	6	12
Lampcurrent SR BGC*[mA]	B/300	10/500	10/400

Instrumental parameters for the determination of lead, copper and nickel

Important regulations for the determination of pollutants in drinking water

Norm/Regulation	Title
EN 1483	Determination of mercury using atomic absorption spectrometry
DIN 38405-24	Determination of chromium (VI) – photometric method for low contaminated water
DIN 38405-35	Determination of arsenic with graphite furnace atomic absorption spectrometry
DIN 38406-8	Determination of zinc with flame atomic absorption spectrometry
ISO 23914-2	Determination of antimony by hydride generation atomic absorption spectrometry
EN ISO 15587-1	Digestion procedures for determination of selected elements in water
DIN EN 26777	Determination of nitrite – spectrometric method
DIN EN ISO 11969	Determination of arsenic with hydride generation atomic absorption spectrometry
DIN EN ISO 7980	Determination of calcium and magnesium using atomic absorption spectrometry
DIN EN ISO 5961	Determination of cadmium using atomic absorption spectrometry
DIN EN ISO 12020	Determination of aluminium using atomic absorption spectrometry
DIN EN ISO 15680	Gas chromatographic determination of aromatic hydrocarbons and chlorinated substances with purge+trap and thermodesorption
DIN EN ISO 16588	Determination of 6 complexing agents with gas chromatography
DIN 38407-2	Gas chromatographic determination of low volatile halogenated hydrocarbons
DIN 38407-3	Gas chromatographic determination of polychlorinated biphenyls
DIN 38407-13	Determination of selected organotin compounds by gas chromatography
DIN 38407-14	Determination of phenoxyalkyl carbonic acids by gas chromatography and mass-spectrometric detection after solid-liquid-extraction and derivatization
DIN 38407-16	Determination of aniline derivates by gas chromatography
DIN 38407-17	Determination of selected nitroaromatic compounds by gas-liquid chromatography
DIN 38407-25	Determination of dalapon, trichloroaceticacid and selected haloacetic acids by gas chromatography (GC-ECD and/or GC-MS detection) after liquid-liquid-extraction and derivatisation
DIN 38413-3	Determination of nitrilotriacetic acid (NTA) and ethylene dinitrilotetraacetic acid (EDTA) by gas chromatography
DIN EN 12673	Gas chromatographic determination of some selected chlorophenols in water
DIN EN 12918	Determination of parathion, parathion-methyl and some other organophosphorus compounds in water by dichloromethane extraction and gas chromatographic analysis
DIN EN ISO 9377-2	Determination of hydrocarbon oil index – Part 2: Method using solvent extraction and gas chromatography
DIN EN ISO 10301	Determination of highly volatile halogenated hydrocarbons – Gas chromatographic methods
DIN 38407-30	Determination of trihalogenmethanes in bathing water and pool water with headspace-gas chromatography
DIN EN ISO 15913	Determination of selected phenoxyalkanoic herbicides, including bentazones and hydroxybenzonitriles by gas chromatography and mass spectrometry after solid phase extraction and derivatization
DIN EN ISO 17495	Determination of selected nitrophenols – Method by solid phase extraction and gas chromatography with mass spectrometric detection
ISO 8165-2	Determination of selected monovalent phenols – Part 2: Method by derivatization and gas chromatography
ISO/DIS 18857-1	Determination of selected alkylphenols – Part 1: Method for non-filtered samples using liquid extraction and gas chromatography with mass selective detection
EN 1484	Water analysis – Guidelines for the determination of total organic carbon (TOC) and dissolved organic carbon (DOC)

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SDG-A-068

Solutions for Drinking Water

There is no such thing as naturally pure water, since in nature all water contains some impurities.

This is why the quantitation of hazardous substances as well as essential elements is monitored continuously according to the European Drinking Water directives.

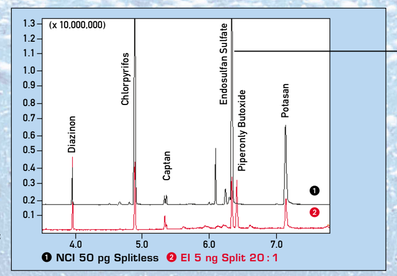
SHIMADZU

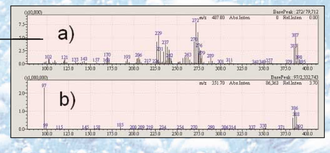
On the safe side

Various analytical systems and techniques for drinking water analysis

No need to sacrifice resolution and sensitivity for speed: GC-2010, the only GC developed for High Resolution Fast-GC with 250 Hz detectors

The QP2010 with its integrated GC-2010 increases your productivity: GCMS-QP2010 with autosampler for liquid, headspace and SPME (Solid Phase Micro Extraction) injection



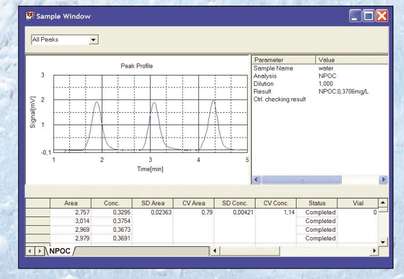


Analysis of organophosphorous pesticides with GCMS-QP2010 in NCI and EI mode with the unique Combi source (a) EI spectrum, b) NCI spectrum

PIA-1000

LC-10AD$_{VP}$

TOC-V$_{CPH}$ with ASI-V



Perfect for complex drinking water analysis: GC and HPLC systems

The new GCMS-QP2010 is a quadrupole mass spectrometer satisfying the highest demands

Sensitive, flexible, reliable

- Unmatched high sensitivity in full scan as well as SIM mode operation through the high luminosity ion source, new patented overdrive lens system, true differential pumping and two-stage quadrupole.
- Optional NCI method (Negative Chemical Ionization) for detecting organophosphorous and organochlorine pesticides in even the lowest concentrations.
- Detection of targets as well as unknowns – by running Scan and SIM in one analysis.
- Newly designed injection system for highest reproducibility.
- Acquisition rate of the QP2010 of 50 Hz in Full Scan mode, for acquisition of accurate mass spectra when performing library search with Fast-GCMS as well as precise quantitative results.
- Possibility of combining the specific detectors of the GC-2010 with the QP2010 in one instrument controlled by the GCMSsolution software.

Comfortable

- GCMSsolution software makes life easy for the user with its comprehensive report functions conforming to EPA standards
- Pesticide library for identification of unknown pesticides.
- Autosampler systems AOC-20i/s and AOC-5000 fully automate GC and GCMS systems.

A large number of accessories for the GCMS-QP2010 make sample preparation easy. Whether headspace, Purge+Trap or SPME (Solid Phase Microextraction) – you have the choice

- The AOC-5000 offers liquid, headspace and SPME injection in one autosampler.
- The new Velocity XPT Purge+Trap system from Tekmar with its moisture control system detects volatiles at ppt level and below. Fully automated, if required.
- Large volume injections with Shimadzu's OCI/PTV (Temperature Programmable Injector) or for highly volatile compounds with the cooled PTV Optic 3 from Atas both automated with the AOC-20i or AOC-5000.

Based on the Shimadzu standard HPLC modules, different configurations are possible:

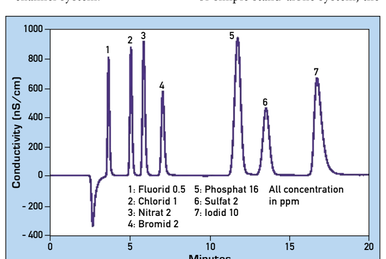
- Analysis of anions (non-suppression)
- Analysis of anions with suppression: this system is completed by using the SAMS and CARS from SeQuant
- Analysis of anions (with or without suppression) and cations combined in a dual channel system.

The modular design of the Shimadzu HPLC allows easy upgrades to a high end system. If required a complete system can be built out of inert (non-metal) HPLC modules.

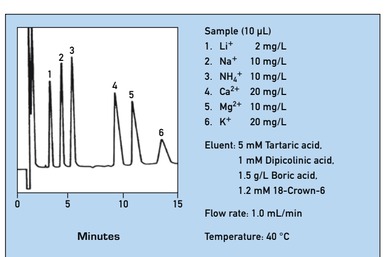
The LCsolution software fully controls each configuration and allows operation according to GLP and FDA compliance.

Whether configured as a portable or simple stand-alone system, the PIA-1000 system offers non-suppression anion or cation analysis. As a stand-alone version the instrument combines a solvent delivery unit, a manual sample injector, a column oven, a conductivity detector, a data processor with a floppy disk drive and a housing for elution and drain bottles in a 15 kg (33 lbs) lightweight compact transportable body.

SAMS and CARS are registered trademarks of SeQuant AB (Umea, Sweden)



Chromatogram of a standard Anion analysis using Suppression
Conditions: Eluent 1.7 mM $NaHCO_3$ / 1.8 mM Na_2CO_3 · Flow 1.00 mL/min
Temperature 27° C



Chromatogram of cation analysis

TOC determination in drinking water

The TOC-V series for drinking water analysis via the NPOC method

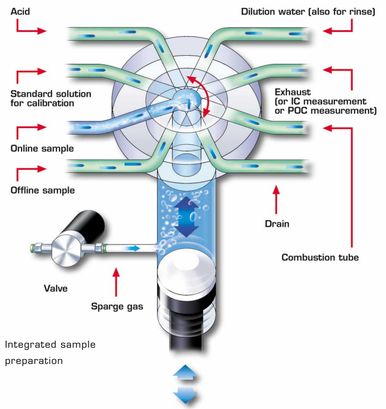
For the first time, the new European drinking water directive introduces the category of indicator parameters. Although not directly health-related, they serve as an indicator function. The list of indicator parameters also includes the TOC value (total organic carbon).

The TOC-V C series is equipped with an ISP (integrated sample preparation) module.

In addition to instrument control and data acquisition, the accompanying TOC-Control software offers many functions that greatly simplify quality assurance in TOC analysis. The quality assurance functions use control charts conforming to the requirements of the German 'Allgemeine Qualitäts-Sicherung' (AQS) which regulates quality control. The TOC-Control V software automatically consults these control charts and issues a warning when unusual results occur.

The ISP module reduces time-consuming sample handling steps

- 8-port valve
- syringe with sparge gas connection
- acidification and sparging in the syringe
- automatic dilution
- extended measuring range
- dilution of highly contaminated samples
- preparation of a multi-point calibration curve from one stock solution.



Integrated sample preparation

Solutions for Drinking Water