947 Professional UV/VIS Detector Vario
943 Professional Reactor Vario
943 Professional Thermostat Vario

UV/VIS detection – an alternative detection method in ion chromatography

Metrohm

UV/VIS Detection – catch the color

02

The 947 Professional UV/VIS Detector Vario enables reliable and accurate quantification of substances that absorb light in the ultraviolet or visible range. The instrument is operated by the user-friendly MagIC Net software and allows a wide variety of analytes to be determined by direct or indirect detection.

Broad area of use

The flow path of Metrohm's IC instruments is completely metal-free, as the measuring cell is made of PEEK. Thus, not only the standard anions and cations, but also transition metal ions and various organic substances can be detected without any problem. Even in complex matrices, e.g. biological samples, good detection limits can be achieved on the basis of the specific absorption properties of many analytes. Depending on the application there is an option to choose either the single (SW) or the multi (MW) wavelenght detector for analysis.

With additional precolumn or postcolumn reaction (PCR) many additional substances can be transformed into UV-active or VIS-active molecules, which makes these substances also detectable with the 947 Professional UV/VIS Detector Vario. Thus, the range of possible applications is extended even further.

943 Professional Reactor Vario for derivatizations

For derivatizations of all kinds, the 943 Professional Reactor Vario is the ideal complement to your analytical system. Its robust design and reaction temperatures of up to 150 °C open up a diversity of possible uses for the 943 Professional Reactor Vario.

The 947 Professional UV/VIS Detector Vario is an alternative to the well-established conductivity detector and extends the family of intelligent detectors from Metrohm. All Metrohm detectors can be swapped round or combined with each other in a flexible way.

947 Professional UV/VIS Detector Vario extends the range of use of the intelligent IC series. The 947 Professional UV/VIS Detector Vario can be combined with the 940 Professional IC Vario and the 930 Compact IC Flex.

Highlights

- UV/VIS detector equipped with diode array
- Available as Single Wavelength, Multi Wavelength detector
- Equipped with longlife lamps
- Depending on the application, only the UV lamp or the VIS lamp is necessary
- Up to 8 variable wavelengths*
- Variable band widths and integration times
- Spectrum recording possible at any time*
- User-friendly operation thanks to MagIC Net
- Many options for data evaluation and representation
- Universal use, many combination possibilities
- Robust, heatable reactor for precolumn and postcolumn derivatizations
- iReactor (intelligent derivatization reactor)
- High precision and measuring accuracy
- Low detection limits even in complex matrices

* This refers to the Multi Wavelenght Detector

Very flexible and easy to use

The diode array detector opens up the possibility to detect a variety of substances across the entire UV/VIS range. Maximum performance in method development is enabled by flexible settings for data recording. For substances with different absorption maxima there are 8 measuring channels and 1 reference channel available. Furthermore, data can be read out via an analog output.

The possibility of connecting a leak sensor makes unattended measuring easier. The UV and the VIS lamp are not included in the scope of delivery. This allows you to choose only the necessary lamp for the application at hand.

Using the Multiwave Detector, the extensive range of possibilities for data evaluation allows you to obtain, for example, up to 10 absorption maxima of a spectrum automatically. That makes it easier to choose the optimum wavelength for a particular application.

Complete system for UV/VIS analysis. The minimum setup consists of a 947 Professional UV/VIS Detector Vario – SW, a 943 Professional Thermostat Vario as column compartment and a 942 Extension Module Vario ONE/Deg.

Applications

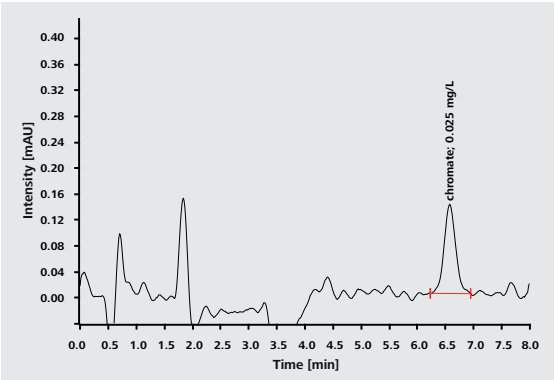
Direct extinction
• Nitrogen compounds NO_2^-, NO_3^-, ...
• Sulfur compounds: S^{2-}, $S_2O_3^{2-}$, SO_3^{2-}, ...
• Halogen compounds: IO_3^-, Br^-, I^-, ...
• Organic substances:
- organic acids
- vitamins
- sweeteners
- caffeine, melamine
• Other ions: CrO_4^{2-}, SCN^-, ...

Postcolumn derivatization
• Transition metals
• Chromate
• Bromate
• Silicate
• Cyanide
• Ammonium
• Aluminum
• Amino acids
• ...

Precolumn derivatization
• Complexing agents: EDTA, NTA, PBTC, THPC, ...

Chromium(VI) in tap water sample

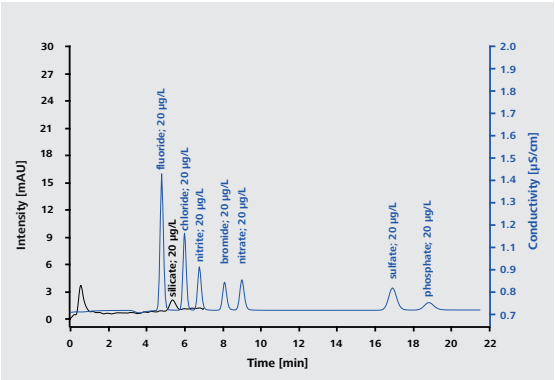
Chromium(VI) is a carcinogenic element where the concentration in leather, toys, packaging, inks or water samples are restricted and need to be monitored. Using a post-column derivatisation method with diphenylcarbazide very low concentrations of chromium(VI) can be determined.



Chromate 0.025 µg/L, column: Metrosep A Supp 17 - 100/4.0, eluent: 70 mmol/L NH_4NO_3, 7.0 mmol/L NaOH, flow 0.7 mL/min, 45 °C, postcolumn reagent: 2 mmol/L 1.5 - diphenylcarbazide, 10% ethanol, 0.5 mol/L sulphuric acid, flow 0.22 mL/min, sample volume 1.325 mL, wavelength 538 nm.

Trace level anions and silicate in boiled feed water

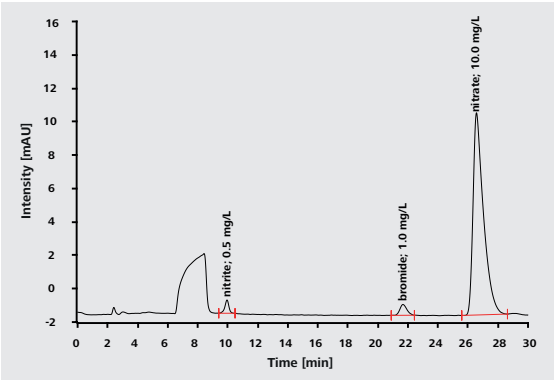
In the power industry, silicate is a water contaminant that should be kept under control to avoid deposits on boiler or steam turbine blades. Silicate can be determined in low µg/L after derivatisation with a molybdate solution. Next to the silicate trace anions impurities can be determined in single analytical determination using conductivity detection.



Silicate next to standard anions (0.02 mg/L), column: Metrosep A Supp 17 - 150/4.0, eluent: 5.0 mmol/L Na_2CO_3, 0.2 mmol/L $NaHCO_3$, flow 0.6 mL/min, 45 °C, postcolumn reagent: 20 mmol/L Na_2MoO_4, 200 mmol/L HNO_3, flow 0.3 mL/min, sample volume 200 µL, wavelength 346 nm.

Nitrite and nitrate in seawater

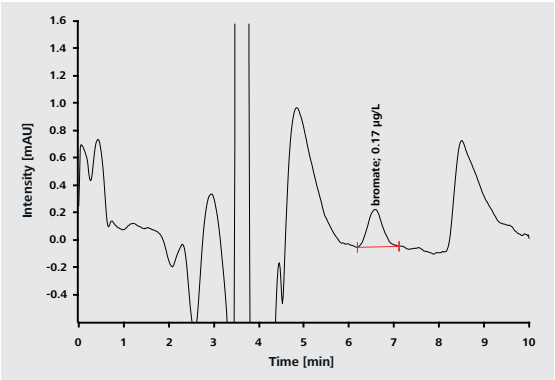
Some ions like nitrite, nitrate, bromide show UV absorption. These characteristics make it possible to detect them next to high concentration of matrix ions like chloride. In conductivity determination, the chloride peak will overlay the peaks of the mentioned ions and they cannot be quantified. Using UV/VIS detection, this problem will be overcome.



Nitrite ((0.5 mg/L), bromide (1.0 mg/L) and nitrate (10 mg/L) in artificial sea water, (28 g/L NaCl), column: Metrosep A Supp 10 - 250/4.0, eluent: 5.0 mmol/L Na_2CO_3, 5.0 mmol/L $NaHCO_3$, flow 1.0 mL/min, 40 °C, chemical suppression, sample volume 10 µL, wavelength 218 nm.

Bromate in tap water

Bromate is classified as a potential carcinogen and needs to be monitored. In tap water the maximum contamination level of 10 µg/L (WHO, EC, EPA regulations) should not be exceeded. For this application, a specific derivatisation procedure using Triiodide Method was applied.



0.1 µg/L bromate spiked in tap water sample, column: Metrosep A Supp 16 - 150/4.0, eluent: 100 mmol/L H_2SO_4, 19.3 µmol/L ammonium heptamolybdate, flow 0.8 mL/min, 45 °C, post-column reagent: 0.27 mmol/L KI, flow 0.15 mL/min sample volume 1200 µL, wavelength 352 nm.

943 Professional Reactor Vario and 943 Professional Thermostat Vario – the ideal supplement to the 947 Professional UV/VIS Detector Vario

The 943 Professional Reactor Vario and the 943 Professional Thermostat Vario are highly flexible. The instrument has metal-free flow paths and can serve as host for other 942 Extension Modules Vario, such as modules with additional pumps or valves. The module can be used both as a heatable precolumn- and postcolumn-reactor and as a column thermostat. Hence, it is offered in two versions:

943 Professional Reactor Vario: Reactor for precolumn or postcolumn reactions

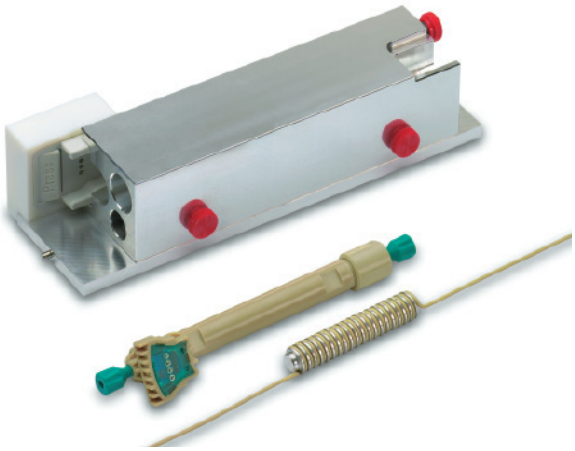
The 943 Professional Reactor Vario features a rapid heating rate and enables precolumn and postcolumn reactions at temperatures as high as 150 °C. Owing to direct heat transfer it is heated up faster and more precisely than conventional reactors or column ovens. Depending on the requirement of your application, postcolumn reagent and eluent can be brought to the right temperature beforehand or the residence time in the reactor can be flexibly adjusted.

Traceability and monitoring are guaranteed in the iReactor by means of a data chip. This integral component of the intelligent IC concept minimizes operator errors and improves the reliability of analysis throughout the analytical system.

The design of the iReactor enables fast and direct heat transfer.

943 Professional Thermostat Vario: Thermostat for column heating

The heated column oven can be operated with temperatures as high as 80 °C. Temperature stability is ensured by a preheating capillary. Up to two columns can be fitted. Monitoring and traceability are also guaranteed in the 943 Professional Thermostat Vario, as a component of intelligent IC.



In the column thermostat it is possible to monitor, for example, an iColumn with its precolumn by the column chip. Temperature fluctuations are ruled out by the integral preheating capillary.

Technical information

947 Professional UV/VIS Detector Vario		
Wavelength	190–900 nm	(Increment 1)
Band width	± 1–50 nm	(Increment 1)
Integration duration	10–247 ms	
Measuring duration	50–2'000 ms	
Measuring principle	Diode array with 1024 diodes	
Lamp lifetime long life UV lamp	approx. 2000 h	
Lamp lifetime long life VIS lamp	approx. 5000 h	

943 Professional Reactor Vario and 943 Professional Thermostat Vario	
Temperature stability	< 0.05 °C deviation
Reproducibility of temperature	< ± 0.2 °C
Temperature accuracy	< 1 °C
Heating time	< 10 min. from 20 °C to 40 °C
Column thermostat	Ambient temperature + 5 °C to 80 °C, adjustable in 0.1 °C steps
Reactor exchange unit intelligent	Ambient temperature + 5 °C to 120 °C, adjustable in 0.1 °C steps
Reactor exchange unit high temperature	Ambient temperature + 5 °C to 150 °C, adjustable in 0.1 °C steps
Without exchange unit	Ambient temperature + 5 °C to 150 °C, adjustable in 0.1 °C steps

Ordering information

2.947.0010 947 Professional UV/VIS Detector Vario – SW (Single Wavelength)
2.947.0020 947 Professional UV/VIS Detector Vario – MW (Multi Wavelength)
2.943.0110 943 Professional Reactor Vario
2.943.0210 943 Professional Thermostat Vario

Accessories for the 947 Professional UV/VIS Detector Vario

6.2804.100 Halogen lamp (VIS)
6.2804.110 Deuterium lamp (UV)

Accessories for the 943 Professional Reactor Vario

6.2744.330 Y-connector 3 × UNF 10/32
6.2845.100 Reactor plate complete to Professional Reactor
6.2845.200 Reactor complete for 6.2845.100
6.1015.100 Metrosep BP 1 Guard/2.0

Accessories for the 943 Professional Thermostat Vario

6.1836.020 Preheating capillary with core, 1.44 m
6.2845.600 Column holder complete for 943 Professional Thermostat Vario

Peripheral devices and other accessories

6.2061.100 Bottle holder for Professional IC Vario instruments
6.2061.110 Tray with sensor for Professional IC Vario instruments
6.2061.120 System Connector

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Subject to change
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