XD 7000 and XD 7500

UV-VIS Spectrophotometers

Experience in Analytics since 1885

Global company family-owned

Tintometer Group

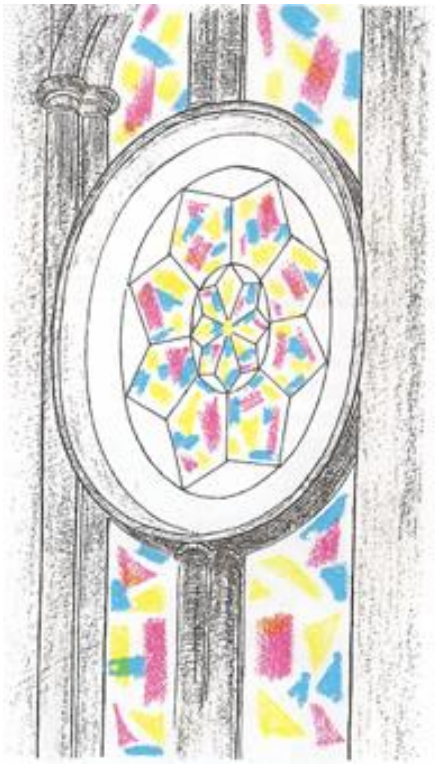
More than 5000 Products for water and color analysis

Instruments and reagents made to solve customer‘s problems

Strong in Research & development

Active sales in over 140 countries

Joseph Lovibond (1833 -1918)



Visual color comparison

Colorimetric Analysis

The Lovibond® Comparator

Photometric Analysis

https://en.wikipedia.org/wiki/Lovibond_comparator

VIS / UV-VIS Spectrophotometers

Workhorse for any environmental laboratory

- Automatic barcode based test recognition
- Automatic cuvette type detection
- For more than 140 Lovibond® analytical methods
- Premium reference beam optics

	XD 7000	XD 7500
	VIS: 320-1100 nm	UV-VIS: 190-1100 nm
Order Code	7130 7000	7130 7500
Light source	Tungsten-Halogen	Xenon Flashlamp (for 500 Million Flashes!)

Convenient

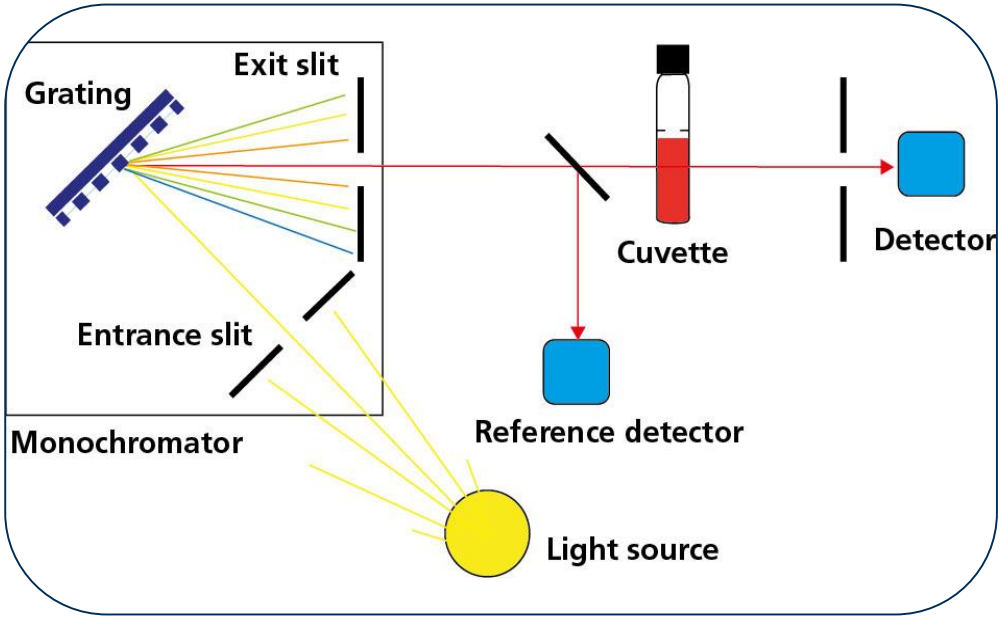
Barcode and Cuvette recognition avoids operation errors.

Unique: A large variety of cuvette types can be used !

- More than 140 preprogrammed Lovibond® methods / Tube Tests are identified via barcodes. External USB barcode reader optional.
- Automatic detection of the cuvette type (correct measurement range). Cuvette types ROUND: 13, 16, 24 mm RECTANGULAR: 10, 20, 50.

High Performance

Monochromator with grating and reference beam optics (split beam, ratio beam, dual beam) and high wavelength accuracy !



Compared to single beam:

- Higher accuracy
- Compensates light source fluctuations.
- Compensates lamp aging and lamp energy changes.
- Avoids many “zero” measurements

XD 7000 and XD 7500: Rapid scans: 700-2000 nm/minute
Various scan step setting: 1, 2, 5, 10 nm

Xenon UV Lamp

Long Life & High Stability

- 500 Million Flashes
- Long life time, saves cost and service time. (A replacement Deuterium Lamp costs around 1700 USD and has average lifetime of 1000 hours)
- Xenon flash lamps emit a brilliant continuous spectrum from UV to infrared and feature a compact construction and less heat generation compared to continuous mode Deuterium lamps.
- Xenon lamps have a higher light output stability.

Deuterium Lamp costs around 1700 USD

Handling benefits

Convenience + Time saving

- Context menus with function keys F1-F4
- Keys for printing, store data and timers
- AutoStorage (optional) of measuring results
- Easy data management via USB
- Direct PDF export

Qualitative Analysis

Spectra scan and more

Spectra + Kinetics

- Different profiles can be stored
- User defined methods at different wavelength
- Editing of spectra + PDF export
- Data transfer to LIMS, CSV or PDF

Analytical Quality Assurance

Check hardware and methods

- Instrument check via Reference Standard Kit
- Method validation via ValidCheck® Standard solutions (Whole system check (incl. chemical methods) and the Matrix effects)
- User administration (GLP) Standard procedures for the analytical Quality Assurance and security:
- Password security and up to three different access levels.

Data transmission features

- Universal PC connection in networks via Ethernet.
  → simple data transfer into LIMS
- Using standard cables, no special cables required
- RS232 virtually via USB
- both data management and updates via different interfaces (USB and Ethernet).

On-Site Service and Analytics

- Low weight of device: approx. 4.5 kg
- Transport box available
- Power supply via car battery possible
- Standard connection cable for cars available

The Water Laboratory: available chemistry

- **Powder reagents:** .
  - **Long shelf life (5 years)** The pillows, individually sealed, with beveled edges, nodge and protected in air tight aluminum foil packs.
  - **Very popular**!.Can be used in all Lovibond photometers and also in other manufacturer‘s photometers (**Vario** Powder Packs /please contact Tintometer for details)
  - **Low transportation cost**

Easy to use and safe dosing

The Water Laboratory: available chemistry

- **Tablet reagents**: remain the most consistent and reliable reagent format available, consistently outperforming other reagent formats, and delivering maximum accuracy for the user.

  - **Highest Quality**: manufactured in Germany under tightly controlled conditions on most modern machinery
  - **Shelf Life**: our tablet reagents shelf life is a minimum of 5 years, and some for as long as 10 years.
  - **Packing:** each tablet is hermetically sealed within an individual aluminum foil pocket, protecting it against humidity and light.
  - **Easy and Safe Operation**: With the blister strip, the user just pushes the tablet through the protective foil, straight into the sample. Simple, time-saving and practical.
  - **No dosing error** and so high accuracy.

The Water Laboratory: available chemistry

- **Liquid reagent tests**: .
  - Easy mixing, no dissolving problems
  - Limited shelf life and high shipping cost.
  - Simple dosing dropwise.
  - Economic

- **Liquid Tube Tests (16mm)**:.
  - Most popular in waste water applications. (COD, TN, TP, TOC, …)
  - Can be used together with many „non Lovibond branded“ photometers.
  - Highest accuracy
  - Bar code reading

Green Chemistry – responsible and sustainable

100% free of boric acid
DIN EN ISO 7393-2
Validated method

Lovibond® stands for:

- reagents that are easy to dose
- reagents that are safe
- reagents that have a long shelf-life
- reagents in exact composition / high reproducibility
- reagents that are environmentally friendly.

The Water Laboratory: Photometer XD 7500

All we need:

XD 7500 equipped with a brilliant color display and RD 125 Thermoreactor

Applications

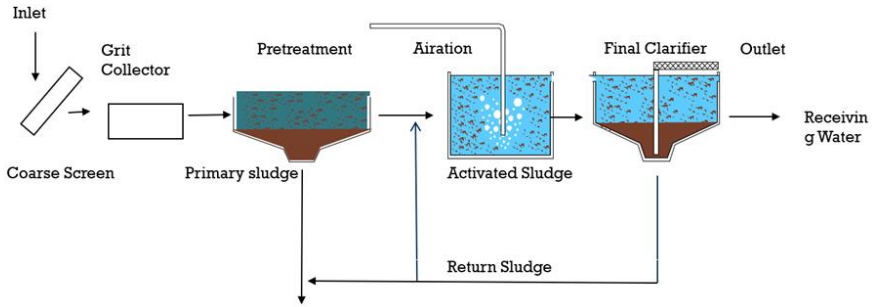
Wherever water is …

- Waste Water Analysis
- Effluent Monitoring
- Drinking Water and Raw Water Analysis
- Surface Water
- Power and Energy
- Amusement Water Parks and Aquariums
- Testing- / Service labs / Mobile labs
- Aquaculture
- Food & Beverage

Wastewater Treatment

monitoring (inlet, outlet, airation, flocculation,…)

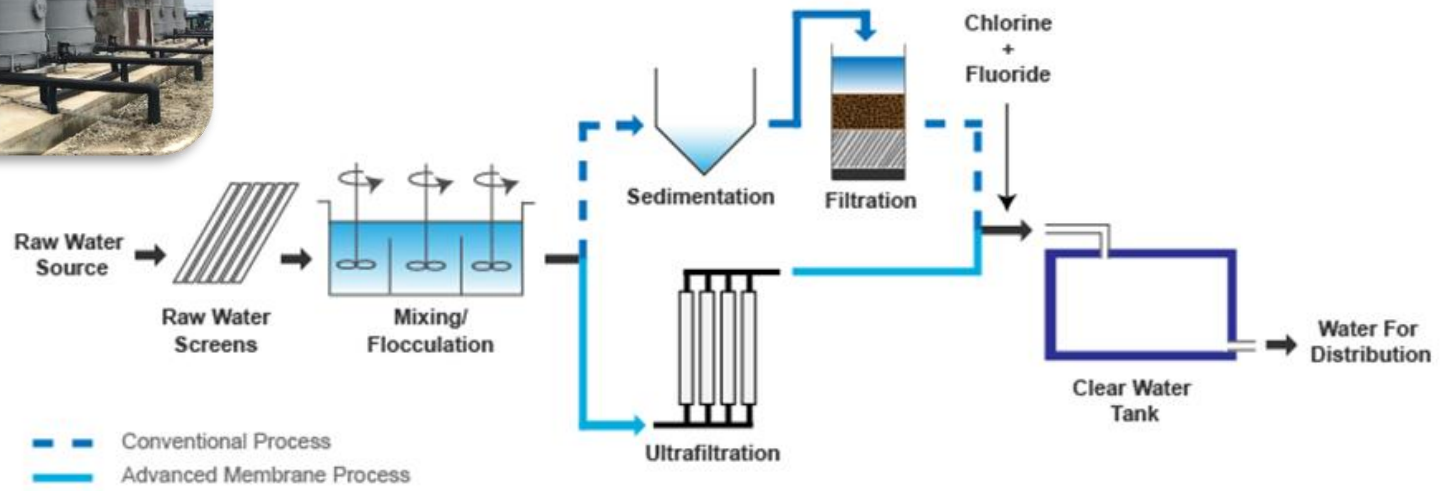
- automatic method selection by barcode is very much appreciated here
- No “zero”-measurement
- Analytical quality assurance supports the needs of
  DWA-A-704 and similar standards



Drinking Water – treatment process

Raw water will often undergo coagulation, sedimentation, sand filtration and disinfection treatments.

Other treatment processes may include pH adjustment, softening, corrosion control chemicals addition, alkalinity adjustment, carbon filtration/adsorption, membrane filtration, slow sand filtration and supplemental fluoridation. The disinfectants applied could include chlorine, chlorine dioxide, ozone, or chloramines.



In Water Works

- ✓ Flocculants:
  - ✓ Aluminium
  - ✓ Iron
- ✓ Raw water contaminants
  - ✓ Manganese (typically 0,001 … 0,3 mg?l)
  - ✓ Iron (typically < 0,3 mg/l)
  - ✓ Ammonium
  - ✓ Nitrate
  - ✓ Nitrit
  - ✓ Phosphate
- ✓ Hardness /Metals:
  - ✓ Total
  - ✓ Calcium
  - ✓ Magnesium
  - ✓ Potassium
  - ✓ Sodium (WHO: 100 …200mg/l)
  - ✓ Silica
- ✓ Anions:
  - ✓ Fluoride (WHO: 1,5 mg/l)
  - ✓ Chloride (typically < 250mg/l)
  - ✓ Sulfate (WHO: < 250 mg/l)
- ✓ Disinfectants:
  - ✓ Chlorine
  - ✓ Ozone

- http://www.who.int/water_sanitation_health/dwq/nutrientsindw.pdf

TDS, Water Hardness / healthy minerals

- TDS stands for total dissolved solids, and represents the total concentration of dissolved substances in water. TDS is basically made up of inorganic salts as calcium, magnesium, potassium, sodium and its anions: carbonates, nitrates (should be low!), bicarbonates, chlorides and sulfates.
- Increased concentrations of dissolved solids (Ca Mg) increase water hardness, which may leave deposits on the insides of hot water pipes and boilers.
- The contribution of water to total dietary intake of minerals can be up to 20%. (mainly Ca 2+ and Mg 2+).
- A bottled natural mineral water of high quality may contain:

Kationen		Anionen	
Natrium	13,5 mg	Fluorid	0,15 mg
Kalium	1,3 mg	Chlorid	21 mg
Magnesium	32,8 mg	Nitrat	<0,3 mg
Calcium	70,4 mg	Sulfat	27 mg
		Hydrogen-carbonat	342 mg

Healthy spa water :
In Carlovy Vary (Czech Republic) water with special healing functions is pumped up from 2000 meters below ground. It contains around **4-6 g/l TDS**, plenty of carbonate, fluoride, calcium, iron, magnesium and several trace minerals.

Nitrate, Nitrite and Phosphate – nutrients and pollutants in raw water

Nitrate and Phosphate are essential plant nutrients, but in excessive amounts they pollute our lakes, streams (algae growth and eutrophication) and ground water. Nitrate is used mainly in inorganic fertilizers for agriculture, so becomes a non point pollutant. It is also used as an oxidizing agent in several industrial applications. The non-point sources of phosphates include: natural decomposition of rocks and minerals, storm-water runoff, agricultural runoff, erosion and sedimentation. Point sources may include: wastewater treatment plants and industrial discharges.

Nitrate / WHO recommended limit	50 mg/l
Nitrite / WHO recommended limit	< 0,1 mg/l
Phosphate /WHO recommended limit	5 mg/l
(equivalent phosphorous)	1,63 mg/l
(phosphorus in Coca Cola)	170 mg/l

http://www.who.int/water_sanitation_health/dwq/chemicals/nitratenitrite2ndadd.pdf

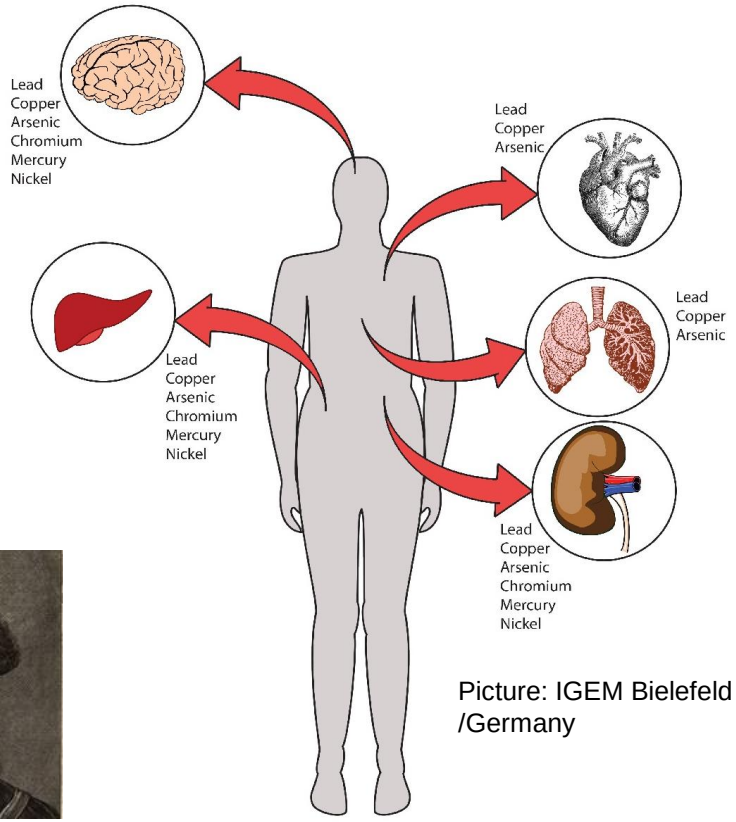
Heavy Metals

Pollution of drinking water sources

1932: Minamata accident. Sewage containing mercury is released by Chiasso chemical works into the Minimata bay in Japan. The mercury accumulated in sea food.(Bioaccumulation of methylmercury in fish)

1986 Sandoz: Water used to extinguish a major fire carries fungizides containing mercury into the upper rhine river. Fish are killed over a stretch of 100 km.

1998: Spain: A bursted dam with mining waste water containing Sulphur, lead, copper, zinc and cadmium polluted the Rio Guadimar.



Picture: IGEM Bielefeld /Germany

Toxic Heavy Metals: mercury, cadmium, lead, arsenic, chromium, nickel, copper.

Essential Metals: iron, zink, copper, chromium, cobalt, molybdenum, selenium, manganese, nickel, …

Poison is in everything and no thing is without poison. The dosage makes it either a poison or a remedy. (Paracelsus)

Metal Analysis

Trace Metals in Drinking Water:

- ✓ Aluminium: **0,01 mg/l** (USEPA: 0,05 mg/l)
- ✓ Arsenic: **0,02 mg/l** (WHO: 0,01 mg/l)
- ✓ Cadmium: **0,025 mg/l** (WHO: 0,003 mg/l)
- ✓ Chromium: **0,005 mg/l** (WHO:0,05 mg/l)
- ✓ Copper: **0,05 mg/l** (WHO:1,0 mg/l)
- ✓ Cyanide**: 0,005 mg/l** (WHO: 0,07 mg/l / USEPA: 0,2mg/l)
- ✓ Iron: **0,01 mg/l** (typically< 0,3 mg/l)
- ✓ Lead: **0,1 mg/l** (WHO:0,01 mg/l)
- ✓ Manganese: **0,01 mg/l** (typically 0,001 to 0,3 mg/l)
- ✓ Molybdenum: **0,5 mg/l**
- ✓ Nickel: **0,02 mg/l**
- ✓ Zinc: **0,02 mg/l** (typically < 3.0 mg/l)

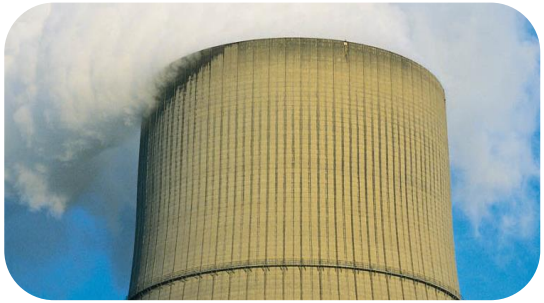
There is no photometric test available for Mercury**.**

Photometric Water Tests:

- Economical
- Quick and reliable
- Raw water check
- Well water test
- Treatment plant management
- Pollution indications

Power and Energy

Cooling- and Boiler Water



- Bigger sensitivity due to 50 mm cuvette option

- Parameter of interest
  - Silica and Hydrazine in steam water
  - Raw water contaminants like Manganese and Iron, Hardness
  - Anions like Chloride, Sulfate
  - Desinfectans like Chlorine, Chlorinedioxide or Ozon
  - all already known for cooling and boiler water

Technical data

	XD 7000	XD 7500
Order Code	7130 7000	7130 7500
Wavelength range	320-1100 nm	190-1100 nm
Optics	Monochromator with Grating and step motor / reference beam	
Lamp	Tungsten-Halogen	Xenon Flashlamp
Display	Colourdisplay 7“ backlit	
Spectral Bandwith	4 nm	
Measurement	Concentration, Absorbance, % Transmission, Kinetics and Spectra in Abs or % Transmission, Multiwavelengths and multistep reading	

Technical data

	XD 7000	XD 7500
Scan speed	700-2000 nm/min., Scans in 1, 2, 5, 10 nm steps of wavelength range	
Wavelength accuracy/ reproduceability	± 1 nm / < 0.5 nm	
Photometric accuracy/ reproduceability	-0.003 E for E < 0.600; 0.5 % of values for 0.600 < E < 2.000	
Barcode	Automatic method recognition including measurement range for all cuvettes	
Cuvette	13, 16 mm and 24mm round, 10 mm, 20 mm, 50 mm rectangular automatic detection w/o adapter	

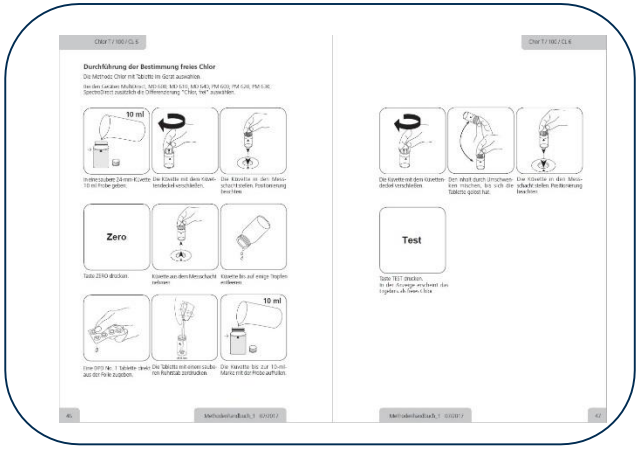
Technical data

	XD 7000	XD 7500
Data storage	5000 measurement values, spectra and kinetics, approx. 40 MB → 500 spectra (300-900 nm) and 400 kinetics with150 measurement values	
Methods and profiles	155 pre-programmed methods, 1000 user-defined methods, 20 profiles for kinetics and spectra, comprehensive programming options	
Interface/update	1 USB-A, 1 USB-B, 1 Ethernet / Update via Internet and USB-Stick	
IP class	IP 30 including drainage in optical compartment	

Support Material

The Handbook of Methods

- Independent Handbook of Methods
- Including a part about analytical basics
- ...and analytical quality assurance
- Instruments manual handling w/o methods
- Short manual for quick start, with safety hints and about general operation, available in many languages



Thank you