FluoTechnik

FLUORESCENT DYES SOLUTIONS

CATALOG
HYDROLOGICAL TRACING

2023/24

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FluoTechnik
FLUORESCENT DYES SOLUTIONS

ARTIFICIAL TRACERS IN HYDROLOGY

The use of artificial tracers in hydrogeology is a very ancient technique. It is an effective tool for managing and preserving water resources and protecting the environment. The increasing demand for hydrological assessments requiring the use of artificial tracers is motivated by two main factors: the challenge of managing water resources and the growth in pollutant shipments.

This new technique means that the fluorescent and saline properties of tracers can be employed to detect the point of origin of water, the location of run-off and hydraulic connections, and to reveal the risks of pollutants spreading. The results obtained can provide definitive answers to all these problems, helping empower economic and social actors regarding their environmental impact.

OVERVIEW OF THE DIFFERENT TRACERS

NAME OF TRACER	EXCIT.	EMIS.	SOLUBILITY	DETECTION THRESHOLD	COLOUR	VISIBILITY TO THE EYE	DEGRADATION	ABSORPTION	INTERFERENCES
URANIN	491 nm	515 nm	600g/L à 20°C	0,001 µg/L	Vert jaune	50 à 100 µg/L	UV; pH<7; micro-organismes oxydants	Faible	Eosine Y
ACIDE AMINO G	345 nm	452 nm	Très faible	0,1 µg/L	Bleu pastel	Invisible	UV ; Oxydants	Moyenne à forte	Tinopal CBS-CL; Naphtionate
SULFORHODAMINE B	565 nm	585 nm	50 g/L	0,01 µg/L	Rouge Fuschia	>500 µg/L	Oxydants	Moyenne	Sulfo G
SULFORHODAMINE G	532 nm	552 nm	5 g/L	0,01 µg/L	Rouge orangé	>500 µg/L	Oxydants	Moyenne	Sulfo B
EOSINE Y	513 nm	537 nm	320 g/L	0,008 µg/L	Rouge	250 à 500 µg/L	UV; Oxydants; pH < 5	Faible	Uranine
NAPHTIONATE	320 nm	420 nm	240 g/L	0,1 µg/L	Bleu pastel	Invisible	UV; pH<4 ou >10, oxydants micro-organismes	Moyenne à forte	Tinopal CBS-CL, Acide amino-G
TINOPAL CBS-CL	350 nm	435 nm	25g/L	0,1µg/L	Bleu pastel	Invisible	UV; oxydants; pH < 7	Moyenne à forte	Naphtionate, Acide amino G
RODAMINE WT	558 nm	583 nm	-	0,01 µg/L	Violet	250 à 500 µg/L	Oxydants	Forte	Sulforhodamine B

SODIUM FLUORESCEIN

HYDROLOGICAL TRACING

APPLICATIONS

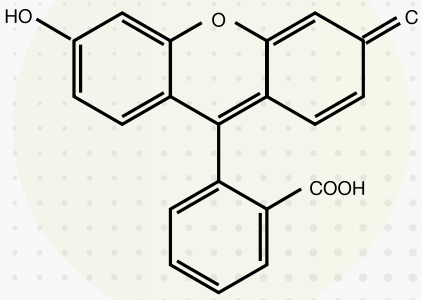
Sodium fluorescein's detection sensitivity and low adsorption tendency means that it is widely used in the field of hydrology to map underground watercourses and check hydraulic connections. It is also employed **for transit and flow-rate studies, river-flow measurements, studies on the movement of infiltration water, layer leakage testing, simulating the application of liquid substances, etc.**

In addition, sodium fluorescein is used to perform a variety of diagnostic tests on networks and pipelines and to detect leaks on roofs and terraces. It is also used as a colorimetric marker in the field of maritime safety; for dyeing chemical and maintenance products; for industrial penetrants; for behavioural studies on insects and animals; in medicine; in aquatic decoration; for damage assessments; etc.

TECHNICAL FEATURES

Chemical name	**Sodium fluorescein, uranine, extra quality**
Presentation	**Powder : rouge brun / Liquide : Vert Jaune**
CAS number	**518-47-8**
EINECS number	**208-253-3**
Color index	**Acide Yellow 73, CI 45350**
Detection threshold	**0,001 mg/l**
Visibility to the eye	**50 à 100 µg/L**
Emission / excitation wavelength	**491nm - 515nm**
Solubility	**Very good - + de 500 g/l**
Degradation	**UV; pH < 7; Humidity content**
Adsorption	**Low**
Interferences	**Eosine**
Purity	**90% min**
Chloride content	**≈ 7%**
Humidity content	**≈ 5%**
pH	**≈ 9**

CHEMICAL FORMULA



Products	References
Fluorescein extra 250g	FLUO.250G
Fluorescein extra 1kg (water soluble bag)	FLUO.1KG
Fluorescein extra 5kg (5x1kg) (water soluble bag)	FLUO.5KG
Fluorescein 5 liters solution 30%	FLUO.CONC.5L

SULFORHODAMINE B

HYDROLOGICAL TRACING

APPLICATIONS

Sulforhodamine B is widely used in the field of hydrology to map underground watercourses and **check hydraulic connections.**

It is also employed for transit and flow-rate studies, riverflow measurements, studies on the movement of infiltration water, layer leakage testing, simulating the application of liquid substances, etc.

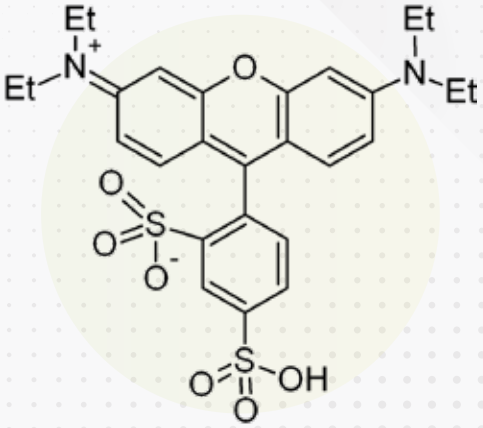
AVAILABLE IN WATER SOLUBLE BAG

READY TO USE

TECHNICAL FEATURES

Chemical name	**Sulforhodamine B**
Presentation	**Powder: dark purple / Liquid: Fuchsia red**
CAS number	**3520-42-1**
EINECS number	**222-529-8**
Detection threshold	**0,01 µg/l**
Visibility to the eye	**> 500 µg/L**
Emission / excitation wavelength	**565ml - 585nm**
Solubility	**50 g/L**
Purity	**Min : 75%**
Degradation	**Oxydants**
Adsorption	**Average**
Interferences	**Sulforhodamine G**

CHEMICAL FORMULA



Products	References
Sulforhodamine B 250g	SULFOB.250G
Sulforhodamine B 1kg (water soluble bag)	SULFOB.1KG
Sulforhodamine B 5kg (5x1kg) (water soluble bag)	SULFOB.5KG
Sulforhodamine B 20% solution (saturated solution)	SULFOB.CONC.5L

SULFORHODAMINE G

HYDROLOGICAL TRACING

APPLICATIONS

Sulforhodamine G (or amido rhodamine G) is valued for its spectral properties in the field of hydrology.

It is widely used in hydrology to map underground watercourses and check hydraulic connections. **It is also employed for transit and flow-rate studies, river-flow measurements, studies on the movement of infiltration water, layer leakage testing, simulating the application of liquid substances, etc.**

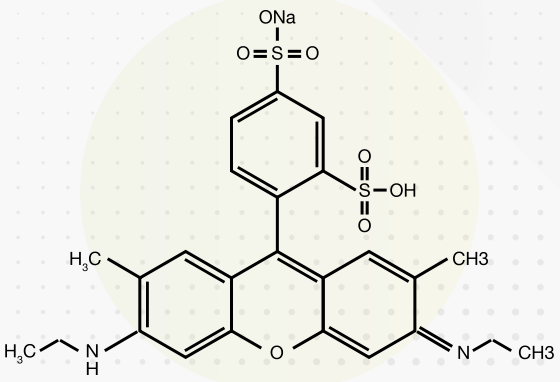
AVAILABLE IN WATER SOLUBLE BAG

READY TO USE

TECHNICAL FEATURES

Chemical name	**Sulforhodamine G / Amino Rhodamine G**
Presentation	**Powder: dark purple / liquid: orangey red**
CAS number	**5873-16-5**
EINECS number	**227-528-6**
Detection threshold	**0,01 µg/l**
Visibility to the eye	**>500 µg/L**
Emission / excitation wavelength	**532nm - 552nm**
Purity	**Min : 75%**
Solubility	**Low – about 5 g/l**
Degradation	**Oxidants**
Adsorption	**Average**
Interferences	**Sulforhodamine B**

CHEMICAL FORMULA



Products	References
Sulforhodamine G 250g	SULFOG.250G
Sulforhodamine G 1kg	SULFOG.1KG
Sulforhodamine G 5kg (5x1kg)	SULFOG.5KG

EOSIN

HYDROLOGICAL TRACING

APPLICATIONS

With spectral and physico-chemical properties similar to those of fluorescein, eosin is a tracer used to map underground water-courses and check hydraulic connections. It is also employed for transit and flow-rate studies, river-flow measurements, studies on the movement of infiltration water, layer leakage testing, simulating the application of liquid substances, etc.

Eosin is also used to perform a variety of diagnostic tests on networks and pipelines; to detect leaks on roofs and terraces; to dye chemical and maintenance products; and in the field of medicine and research.

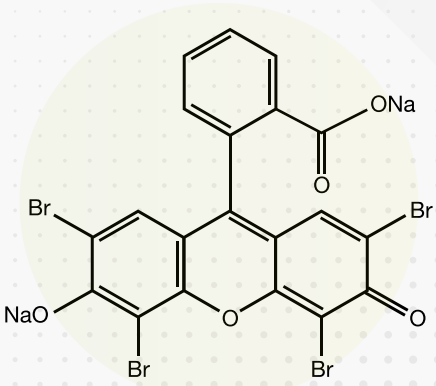
AVAILABLE IN WATER SOLUBLE BAG

READY TO USE

TECHNICAL FEATURES

Chemical name	**Eosin Y**
Presentation	**Powder: reddish / liquid: orangey red**
CAS number	**17372-87-1**
EINECS number	**241-409-6**
Detection threshold	**0,008 mg/l**
Visibility to the eye	**250 à 500 µg/L**
Emission / excitation wavelength	**513nm - 537nm**
Solubility	**Good -> 300 g/l**
Purity	**Min. : 85%**
Degradation	**UV ; Oxydants ; Ph < 5**
Adsorption	**Low**
Interferences	**Uranine**

CHEMICAL FORMULA



Products	References
Eosin extra 250g	EOS.250G
Eosine extra 1kg (water soluble bag)	EOS.1KG
Eosine extra 5kg (5x1kg) (water soluble bag)	EOS.5KG
Eosin 20% solution (concentrated solution)	EOS.CONC.5L

RHODAMINE WT 20%

HYDROLOGICAL TRACING

APPLICATIONS

Rhodamine WT is valued in the field of hydrology for its spectral properties. It is widely used in hydrology to map underground watercourses and check hydraulic connections.

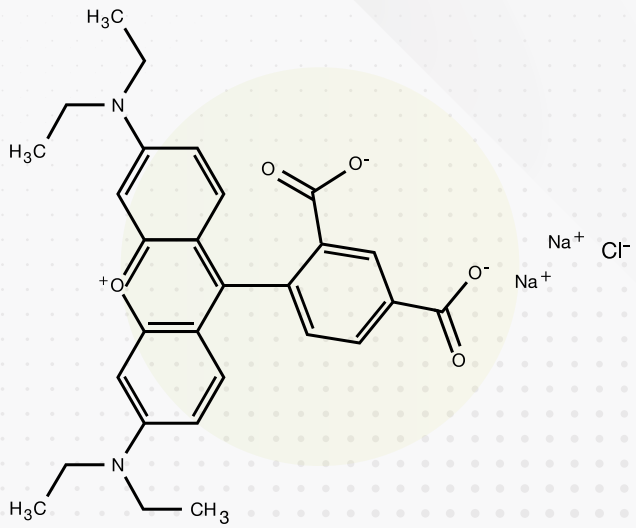
It is also employed for transit and flow-rate studies, river-flow measurements, studies on the movement of infiltration water, layer leakage testing, simulating the application of liquid substances, etc.

READY TO USE

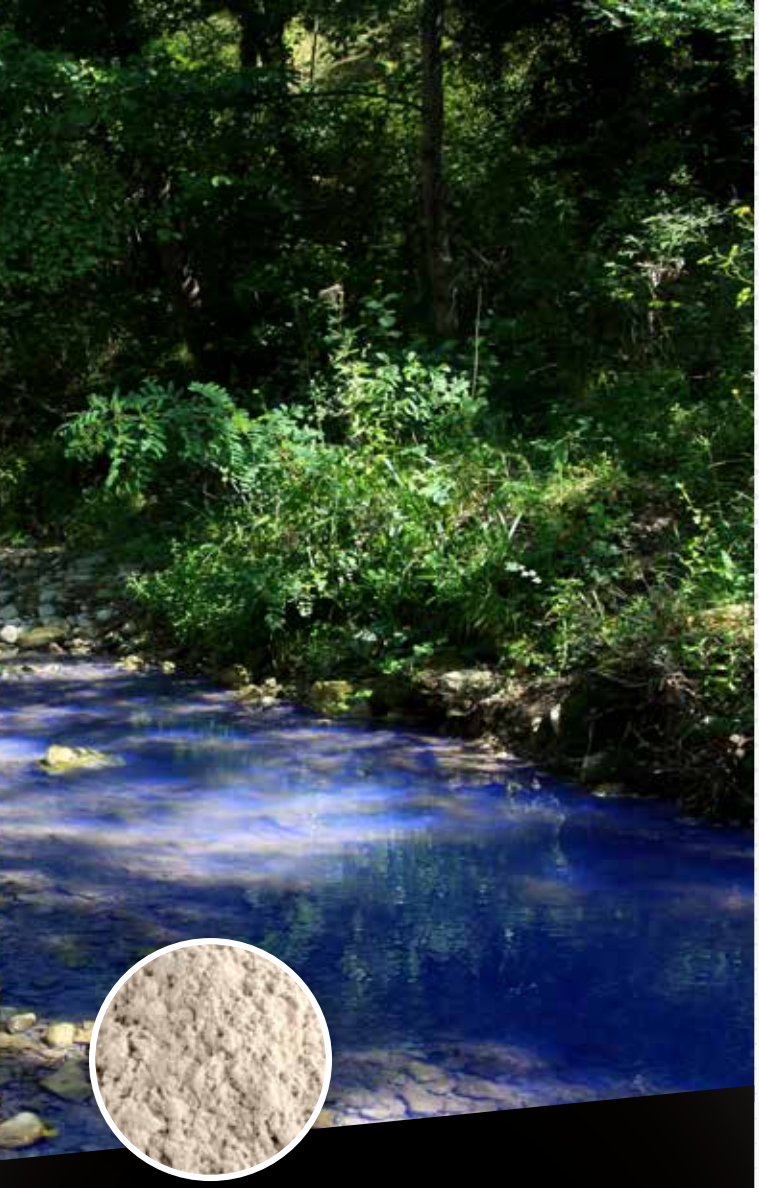
TECHNICAL FEATURES

Chemical name	**Rhodamine WT 20%**
Presentation	**Concentrated liquid, dark purple in colour**
CAS number	**37299-86-8**
Detection threshold	**0,01 µg/l**
Visibility to the eye	**250 à 500 µg/L**
Emission / excitation wavelength	**558/583**
Degradation	**Oxidants**
Adsorption	**Strong**
Interferences	**Sulforhodamine B**

CHEMICAL FORMULA



Products	References
Rhodamine WT 20% 100g (20% Liquid Solution)	RHODA.WT20.100G
Rhodamine WT 20% 1Kg (20% Liquid Solution)	RHODA.WT20.1KG
Rhodamine WT 20 % 25 Kg (20% Liquid Solution)	RHODAWT20-25KG



AMINO G ACID

HYDROLOGICAL TRACING

APPLICATIONS

AMINO G ACID is valued highly in the field of hydrology for its spectral properties and low colouration. It is widely used to map underground watercourses and check hydraulic connections.

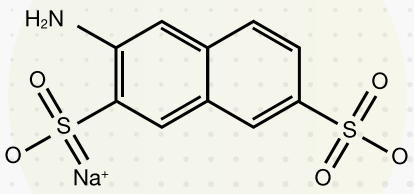
It is also employed for transit and flow-rate studies, river-flow measurements, studies on the movement of infiltration water, layer leakage testing, simulating the application of liquid substances, etc.

AVAILABLE IN WATER SOLUBLE BAG

TECHNICAL FEATURES

Chemical name	**Monosodium salt, Acid 7 – aminonaphthalene**
Presentation	**Powder: white – greyish / Liquid: pastel blue**
CAS number	**86-65-7**
EINECS number	**201-689-2**
Detection threshold	**0,1 µg/l**
Visibility to the eye	**Invisible**
Emission / excitation wavelength	**345 mm - 452 nm**
Solubility	**Low – <5 g/l**
Purity	**Min. : 80%**
Degradation	**UV ; Oxidants**
Adsorption	**Average to high**
Interferences	**Tinopal CBS-X, Naphtionate**

CHEMICAL FORMULA



Products	References
Amino G Acid 250g	AMINOG.250G
Amino G Acid 1kg (water soluble bag)	AMINOG.1KG
Amino G Acid 5kg (5x1kg) (water soluble bag)	AMINOG.5KG

TINOPAL

HYDROLOGICAL TRACING

APPLICATIONS

Tinopal CBS-X is a colourless tracer (or optical brightener) regularly used to map underground watercourses and check hydraulic connections.

It is also employed for transit and flow-rate studies, river-flow measurements, studies on the movement of infiltration water, layer leakage testing, simulating the application of liquid substances, etc.

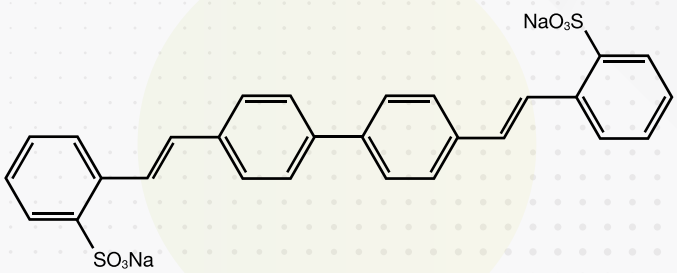
AVAILABLE IN WATER SOLUBLE BAG

READY TO USE

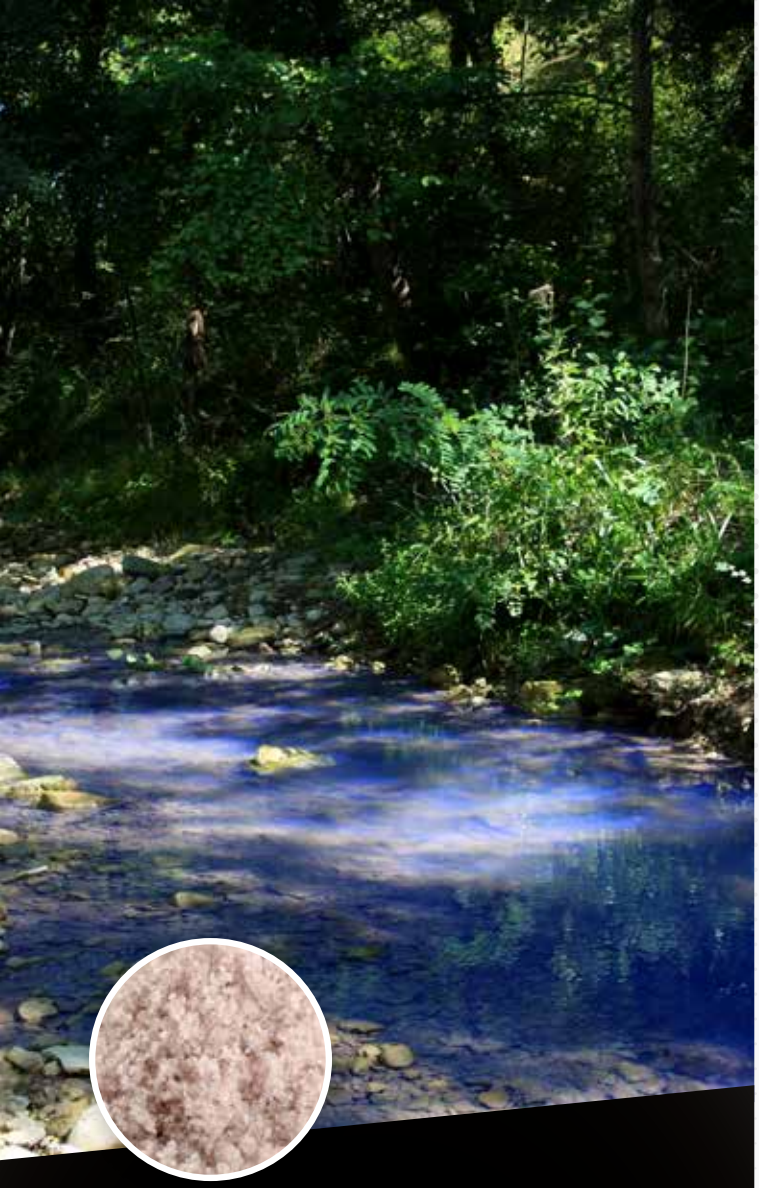
TECHNICAL FEATURES

Chemical name	**Tinopal CBS-CL liquid 10%**
Presentation	**Powder: yellow / Liquid: pastel blue**
CAS number	**38775-22-3**
Detection threshold	**0,1 µg/L**
Visibility to the eye	**Invisible**
Emission / excitation wavelength	**350nm - 435nm**
Solubility	**Very low – about 25 g/l**
Degradation	**UV ; oxidants ; pH < 7**
Adsorption	**Average to high**
Interferences	**Naphtionate, Acide-Amino-G**

CHEMICAL FORMULA



Products	References
Tinopal CBS-X 1kg	TINO.CBSX.1KG
Tinopal CBS-CL 20L (10%Solution - UNIQUEMENT SUR COMMANDE)	TINO.CBSCL.20L



SODIUM NAPHTIONATE

HYDROLOGICAL TRACING

APPLICATIONS

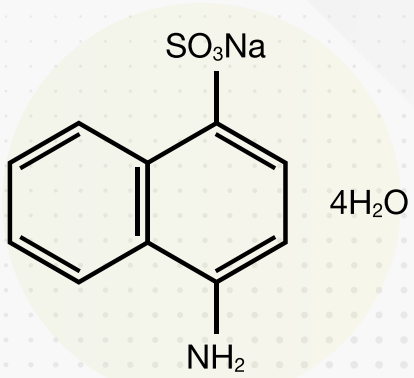
Sodium naphthionate is valued in the field of hydrology for its spectral properties and low colouration. It is a tracer (optical brightener) that is widely used to map underground watercourses and check hydraulic connections.

It is also employed for transit and flow-rate studies, river-flow measurements, studies on the movement of infiltration water, layer leakage testing, simulating the application of liquid substances, etc.

TECHNICAL FEATURES

Chemical name	**Sodium Naphtionate**
Presentation	**Powder: white / liquid: pastel blue**
CAS number	**130-13-2**
Detection threshold	**0,1 µg/l**
Visibility to the eye	**Invisible**
Emission / excitation wavelength	**320nm - 420nm**
Solubility	**Moderate – about 200 g/l**
Purity min.	**75%**
Insoluble	**≈ 0,12%**
Degradation	**UV; Ph<4 or >10; oxidising micro-organisms**
Absorption	**Average to high**
Interferences	**Tinopal CBS-X, Acide-Amino-G**

CHEMICAL FORMULA



Products	References
Sodium Naphtionate 250g	NAPH.250G
Sodium Naphtionate 1kg	NAPH.1KG
Sodium Naphtionate 5kg	NAPH.5KG

IODIDE POTASSIUM

HYDROLOGICAL TRACING

APPLICATIONS

Potassium iodide is an inorganic compound with the chemical formula KI. It takes the form of a white crystalline solid consisting of K+ potassium and iodide I– ions. It is less hygroscopic than NaI sodium iodide and is easier to handle. It has a yellowish tint when it contains impurities or under the effect of aging, since the I– iodide ions oxidise in iodine I2 on prolonged contact with air.

The iodide ions in aqueous solution are colourless; they are non-toxic for humans and the environment.

Their different chemical properties mean that they can participate in several types of reactions :

• In organic chemistry, iodide ions are a strong nucleophile (electron donor site) that are often found in substitution reactions.

• In complex chemistry, iodide ions tend to easily create complexes or precipitate, especially with Ag+ ions, which can be used in the dosages.

• In redox reaction, I– is the reducer in the I2/I– couple. The I2 diode is detectable by spectrophotometric measurements due to its yellow colour in an aqueous medium.

TECHNICAL FEATURES

Chemical name	**Potassium iodide**
Quality	**Extra Pure**
Molecular formula	**KI**
Chemical structure	**K+I-**
ICAS number	**7681-11-0**
EC number	**231-659-4**
Shelf life	**2 years**
Characteristics	**Potassium Identification: Positive Iodide identification: Positive Test : 99.0 – 100.5% Loss on drying : 1.0% max. Heavy metals : 10 ppm max. Sulphate : 150 ppm max. Iron : 20 ppm max**

Product	References
Iodure de potassium vrac fût 25kg - (Only to order)	IOD.POT.25KG

EnviroLOG

HYDROLOGICAL TRACING

EnviroLOG is a standalone environmental hub that incorporates all that you require for a survey operation - command and control of your sensors, data display, data logging and battery power in a small robust package.

Up to 3 devices can be interfaced to EnviroLOG where a user definable observation scenario can be programmed to control those devices as a group. EnviroLOG is designed for Valeport's Hyperion range of Fluorometer sensors: Chlorophyll a, Fluorescein, Rhodamine, Phycocyanin and Turbidity.

EnviroLOG will automatically recognise the type of sensor interfaced and suitable header and units fields can be populated.

A 7.2 or 14Ah battery can be fitted to supply power for all three sensors. The data is stored internally and can be recovered either over Bluetooth or through the serial comms\charging port.

Product	References
ENVIROLOG	EnviroLOG

	Optical	Linear Range		Minimum Detection
		Nephelometer	Optical Backscatter	
Turbidity	850 nm	0 to > 1,000 - linear response	0 to >6,000 - linear response	0.03 NTU

(>6,000 NTU has a non-linear monotonic response that allows derivation of higher values using look-up tables)

TECHNICAL FEATURES

Fluorophore	Excitation	Detection	Dynamic Rage	Minimum Detection
Chlorophyll a*	470 nm	696 nm	0-800 ug\l	0.025 ug\l
Phycocyanin** (Fresh Water Blue Green Algae)	590 nm	650 nm	0-9000 ppb	0.08 ppb
Crude Oil***	365 nm	410 – 600 nm	0 – 1500 ppb	0.2 ppb

Fluorophore	Excitation	Detection	Dynamic Rage	Minimum Detection
fDOM/CDOM*** (fluorescent Dissolved Organic Matter)	365 nm	470 nm	0 - 2000 ppb	0.5 ppb
Fluorescein**** (Uranine)	470 nm	545 nm	0 – 500 ppb	0.01 ppb
Rhodamine****	520 nm	650 nm	0 – 1000 ppb	0.01 ppb

** Calibrated against Chlorophyll a in acetone solution | ** Calibrated against Phycocyanin in water\Phosphate buffer solution | *** Calibrated against PTSA **** Calibrated against Fluorescein\Rhodamine solution - Linearity measured to better than 0.99 R2*

EnviroLOG 4G

HYDROLOGICAL TRACING

Valeport's EnviroLog 4G is a rugged, ultra-low-power 4G remotecontrol, telemetry and logging module providing a flexible solution forharsh environmental conditions. It has an industry-leading range of data collection, delivery and management options.**The EnviroLog 4G is effectively a "platform" that offers fully scriptable operational scenarios for the collection, handling and delivery of data from a number of Valeport instruments.**

Specific data collection scenarios can be scripted quickly and with no firmware development involved and even updated 'over the air' with no need to visit the site.

Valeport can assist with sample scripts for you to adapt if required. **EnviroLog 4G has highly efficient power management capabilities that enable long battery life even** when performing complex scripts and calculations.

MARKET

- Environmental monitoring
- Surface Water and Wastewater
- Utilities
- Industrial
- Coastal monitoring

OPERATING MODES

For battery operation, the **EnviroLog 4G stays in ultra low-power sleep mode and wakes up on a trigger or internal timer to collect data from the interfaced instrument(s).**

It will transmit the data as scheduled, or on scripted conditions. For more information see the data sheet

Products	References
ENVIROLOG 4G	EnviroLOG 4G

HYPERION FLUORESCEIN

HYDROLOGICAL TRACING

Hyperion Fluorometer sensor range delivers high performance measurements of Chlorophyll a, Phycocyanin, Fluorescein (Uranine), or Rhodamine in a compact & robust package ideal as a standalone sensor, for ROV and AUV integration or used with as part of a multi-sensorarray and data logger.

Offered as standard in a 6000m depth rated, titanium housing the Hyperion Fluorometer has a wide range (9-28V DC) isolated power supply, data output up to 32Hz and RS232, RS485 and Modbus communications.

Hyperion Fluorometers can be supplied in a more rugged form that includes Acetal protection rings, a shaped anti-snag connector cover and a Kevlar weave protected cable.

TECHNICAL FEATURES

	Fluorescein*
Excitation	**470 nm**
Detection	**545 nm**
Dynamic Range: gain setting is software controlled	**0-500 ppb** **2 gain** **settings: 0-25, 0-500**
Minimum Detection (3x SD in RO water)	**0.01 ppb**
Linearity	**0.99 R2**
Response Time	**0.03 - 2 sec**
Output Rate	**0.5 Hz - 32 Hz** **(free running) software controlled**

** Calibrated against Fluorescein\Rhodamine solution*

ELECTRICAL

External	**9 – 28V CC, Isolée**
Power	**<600mW**
Connector	**SubConn MCBH6F**

SOFTWARE

Valeport supply DataLog x2 Windows software for instrument setup, data download and display.

PHYSICAL

Materials	**Titanium with Sapphire glass window**
Depth Rating	**6 000m**
Dimensions	**40mmØ x 179.5mm (including connector)**
Weight	**0.50 kg (in air)**
	0.26 kg (in water)
Operating Temp	**-5°C - 35°C (the sensor is damaged above 60°C)**

ORDERING

0901001 - F	**Fluorescein (Uranine)**
	Supplied with: **• 1x Hyperion Instrument** **• 1x 0.5m pig tail** **• Manual and transit case** **• DataLog x2 Software**
0901EA2	**• Hyperion interface cable to Envirolog system** **• Cable Several cable lengths available**

COMMUNICATIONS

The instrument will operate in real time, with set up performed by direct communications with a PC before and after deployment.

RS232 | RS485	**Baud rate: 2400 - 230400** **8 data bits | 1 stop bit | No parity** **No flow control** **USB: cable and converter supplied (RS232 to USB)**
RS485 Modbus RTU	**Baud rate: 2400 - 230400** **8 data bits | 1 stop bit | No parity** **No flow control**

Products	References
HYPERION FLUORESCEIN	Hyperion FLUO

HYPERION RHODAMINE

HYDROLOGICAL TRACING

Hyperion Fluorometer sensor range delivers high performance measurements of Chlorophyll a, Phycocyanin, Fluorescein (Uranine), or Rhodamine in a compact & robust package ideal as a standalone sensor, for ROV and AUV integration or used with as part of a multi-sensor array and data logger.

Offered as standard in a 6000m depth rated, titanium housing the Hyperion Fluorometer has a wide range (9-28V DC) isolated power supply, data output up to 32Hz and RS232, RS485 and Modbus communications.

Hyperion Fluorometers can be supplied in a more rugged form that includes Acetal protection rings, a shaped anti-snag connector cover and a Kevlar weave protected cable.

TECHNICAL FEATURES

	Rhodamine*
Excitation	**520 nm**
Detection	**650 nm**
Dynamic Range: gain setting is software controlled	**0-1 000 ppb 2 gain settings: 0-50, 0-1 000**
Minimum Detection (3x SD in RO water)	**0.01 ppb**
Linearity	**0.99 R2**
Response Time	**0.03 - 2 sec**
Output Rate	**0.5 Hz - 32 Hz (free running) software controlled**

** Calibrated against Fluorescein\Rhodamine solution*

ELECTRICAL

External	**9 – 28V DC Isolated**
Power	**<600mW**
Connector	**SubConn MCBH6F**

SOFTWARE

Valeport supply DataLog x2 Windows software for instrument setup, data download and display.

PHYSIQUE

Materials	**Titanium with Sapphire glass window**
Depth Rating	**6 000m**
Dimensions	**40mmØ x 179.5mm (including connector)**
Weight	**0.50 kg (in air)**
	0.26 kg (in water)
Operating Temp	**-5°C - 35°C (the sensor is damaged above 60°C)**

ORDERING

0901001 - R	**Rhodamine**
	Supplied with: • **1x Hyperion Instrument** • **1x 0.5m pig tail** • **Manual and transit case** • **DataLog x2 Software**
0901EA2	• **Hyperion interface cable to Envirolog system** • **Cable Several cable lengths available**

COMMUNICATIONS

The instrument will operate in real time, with set up performed by direct communications with a PC before and after deployment.

RS232 | RS485	**2400 - 115200 baud** **8 data bits / 1 stop bit / No parity / No flow control** **No flow control** **USB: Cable and RS232 to USB converter supplied**
RS485 Modbus RTU	**19200 baud** **8 data bits / 1 stop bit / Same parity / No flow control** **No flow control**

Products	References
HYPERION RHODAMINE	Hyperion RHODA

HYPERION TURBIDITY

HYDROLOGICAL TRACING

OPTICAL TURBIDITY SENSOR

The new Valeport Hyperion-T is essentially 2 sensors in one. The first is a "classic" turbidity sensor, a nephelometer that uses a 90° beam angle, for low turbidity levels (0 to 1,000 NTU). The second, for high turbidity levels (1,000 to 6,000 NTU) uses an Optical Backscatter (OBS) arrangement (~120° beam angle).

Intelligent sampling and use of a 24 bit ADC eliminates the need to gain switch at higher turbidity levels. The optical head is very compact – measuring just 20mm in diameter and with a full ocean depth rating lends itself to OEM type solutions.

A compact & robust package ideal as a standalone sensor, for ROV and AUV integration or used as part of a multi-sensor array and data logger system.

Offered as standard in a 6,000mdepth rated, titanium housing the Hyperion Turbidity Instrument has a wide range (9-30V DC) isolated power supply, data output up-to 16Hz on RS232 and RS485 or Modbus.

TECHNICAL FEATURES

	Turbidity
Dynamic Range	**Nephelometer: 0 to >1 ,000 NTU - linear response OBS: 0 to >6,000 NTU - linear response >6,000 NTU has a non-linear mono-tonic response that allows derivation of higher values using look-up tables**
Linearity	**0.99 R2**
Minimum Detection Level	**0.03 NTU (Nephelometer)**

ELECTRICAL

External	**9-30V DC Isolated**
Power	**<600mW**
Connector	**SubConn MCBH6F**

SOFTWARE

Valeport Datalog X2 software for instrument setup

PHYSIQUE

Matériaux	**Titane; fenêtre Sapphire**
Profondeur	**6 000m**
Dimensions	**40 mm Ø x 179,5 mm (connecteur inclus)**
Poids	**0,50 kg (dans l'air)**
	0,26 kg (dans l'eau)
Température de fonctionnement	**Entre -5°C et 35°C (au-dessus de 60°C, le capteur sera endommagé)**

ORDERING

0901002 - T	**Hyperion Turbidity**
	Supplied with: **• 1x Hyperion Instrument • 1x 0.5m pig tail • Manual and transit case • DataLog x2 Software**
0901EA2	**• Hyperion interface cable to Envirolog system • Cable Several cable lengths available**

COMMUNICATIONS

The instrument will operate in real time, with set up performed by direct communications with a PC before and after deployment.

RS232 | RS485	**Baud rate: 2400 - 230400 8 data bits | 1 stop bit | No parity | No flow control No flow control USB: cable and converter supplied (RS232 to USB)**
RS485 Modbus RTU	**19200 baud 8 data bits / 1 stop bit / Same parity / No flow control No flow control**

Products	References
HYPERION TURBIDITY	Hyperion TURB

HYPERION SULFORHODAMINE B

HYDROLOGICAL TRACING

Valeport's Hyperion Sulforhodamine B sensor delivers high performance measurements of Sulforhodamine B in a compact & robust package ideal as a standalone sensor, for ROV and AUV integration or used as part of a multi-sensor array and data logger.

Offered as standard in a 6000m depth rated, titanium housing the Hyperion Fluorometer has a wide range (9-28V DC) isolated power supply, data output up to 16Hz and RS232, RS485 and Modbus RTU communication protocols. Hyperion offers an industry leading dynamic range with no adjustment of gain settings required.

Hyperion Fluorometers can be supplied in a more rugged form that includes Acetal protection rings, a shaped anti-snag connector cover and a Kevlar weave protected cable

TECHNICAL FEATURES

	Sulforhodamine B*
Excitation	**520 nm**
Detection	**650 nm**
Dynamic Range	**0 - 1 000 ppb**
Minimum Detection (3x SD in RO water)	**0,03 ppb**
Linearity	**0.99 R2**
Response Time	**0.03 - 2 sec**
Output Rate	**0.5 Hz to 16 Hz (free running) software controlled**

** Calibrated against Sulforhodamine B solution*

ELECTRICAL

External	**9 – 28V DC, Isolée**
Power	**<600mW**
Connector	**SubConn MCBH6F**

SOFTWARE

Valeport supply DataLog X2 Windows software for instrument setup.

PHYSICAL

Materials	**Titanium with Sapphire glass window**
Depth Rating	**6 000m**
Dimensions	**40mmØ x 179.5mm (including connector)**
Weight	**0.50 kg (in air)**
	0.26 kg (in water)
Operating Temperature	**-5°C to 35°C (the sensor is damaged above 60°C)**

ORDERING

0901001 - SRB	**Hyperion Sulforhodamine B instrument**
	Supplied with: • **Y lead** • **Manual and transit case** • **DataLog X2 Software**
0901EA2	• **Hyperion interface cable to Envirolog system** • **Cable Several cable lengths available**

COMMUNICATIONS

The instrument will operate in real time, with set up performed by direct communications with a PC before deployment.

RS232 | RS485	**Débit en baud : 2400 - 230400** **8 bits de données | 1 bit d'arrêt | Pas de parité** **Pas de contrôle de flux** **USB: câble et convertisseur fournis (RS232 vers USB)**
RS485 Modbus RTU	**2400 - 230400 bauds** **8 bits de données | 1 bit de stop | Parité paire |** **Pas de contrôle de flux**

Products	References
SULFORHODAMINE B	Hyperion SULFO

HYPERION VALIDATION BY CETRAHE

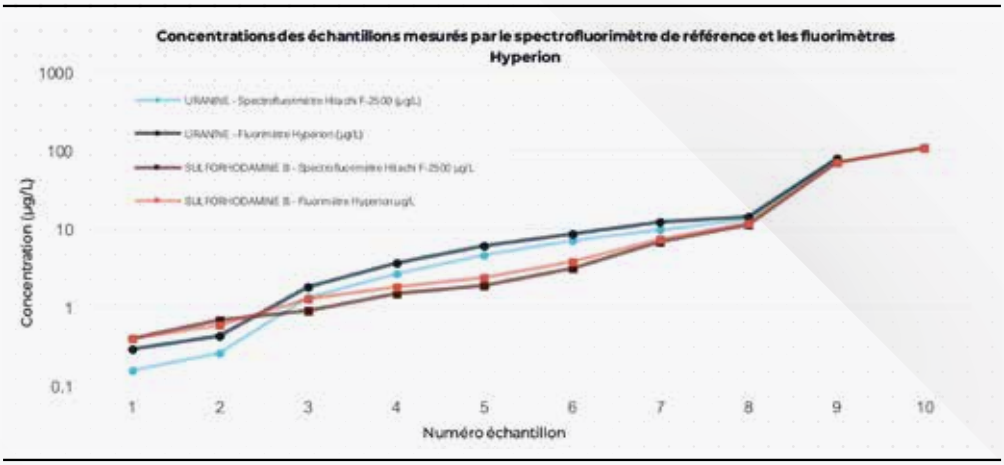
R&D CELL FOR EXPERTISE AND TRANSFER IN TRACING APPLIED TO HYDROGEOLOGY AND THE ENVIRONMENT

OBJECTIVES

The CETRAHE R&D unit (Cellule R&D d'Expertise et de Transfert en Traçages appliqués à l'Hydrogéologie et à l'Environnement de l'Université d'Orléans) was asked to collaborate on a test and validation programme to evaluate the sensitivity and measurement accuracy of Valeport Water's Hyperion range of fluorometers with CETRAHE's HITACHI F2500 spectrofluorometer by carrying out fluorescence measurements, for different concentrations of uranine and sulforhodamine B, in a controlled environment.

To perform the measurements with both the fluorometer and the spectrofluorometer, a simple protocol was established. Solutions with different and unknown concentrations were made, the concentrations were measured with both the spectrofluorometer and the Hyperion. The results are shown in the graph below.

RESULTS OBTAINED



CONCLUSION OF THE EVALUATION

Extract from the report produced by CETRAHE : «The raw results show consistent values between the measurements obtained by the fluorometer and the laboratory spectrofluorometer. [...] The first series of tests showed a very good sensitivity of the «Valeport» fluorometer with regard to the detection of the two tracers as well as a very honourable measurement performance. These laboratory tests with CETRAHE demonstrated good measurement quality and accuracy of Valeport Water's Hyperion compared to a reference spectrofluorometer.

For more details on the test conditions and findings, contact us or CETRAHE.

FOR ON-SITE INSTALLATION

Offered as standard in a titanium housing, the Hyperion Fluorometer has a wide range isolated power supply (9-28V DC), data output up to 16Hz and RS232, RS485 and Modbus RTU communication protocols. For on-site installation, in conjunction with the Hyperion Fluorometer, Valeport Water offers two different stand-alone data loggers for a complete measurement solution.

THE ENVIROLOG

A stand-alone logger that integrates everything needed for operation: data display, data logging and battery power in a small, rugged case.

THE ENVIROLOG 4G

A modular, rugged, 4G communicating, stand-alone data logger that provides a highly flexible solution. The EnviroLog 4G is a 'platform' that provides fully programmable operational scenarios for data collection, processing and distribution.

FluoTechnik

FLUORESCENT DYES SOLUTIONS

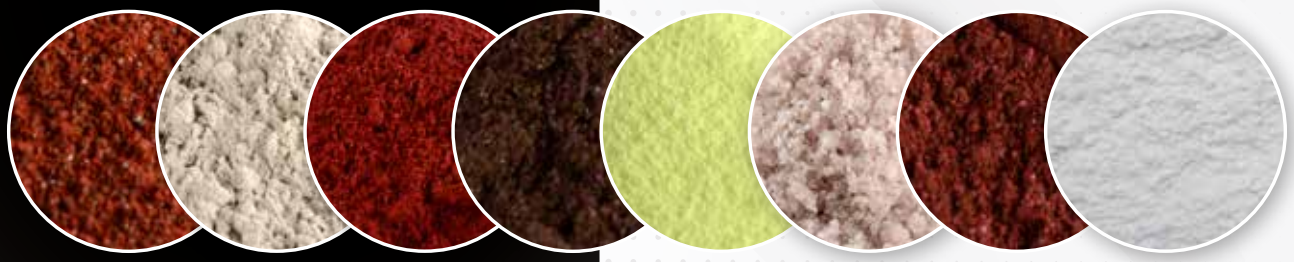
RENTAL PRICE LIST 2023

DESIGNATION OF THE MATERIAL	1 WEEK	MORE VALUE BY WEEK ADDITIONAL
ENVIROLOG + EXTERNAL BATTERY	235 €	45 €
ENVIROLOG 4G* + EXTERNAL BATTERY COMMUNICATION AND HOSTING INCLUDED.	380 €	80 €
RHODAMINE FLUOROMETER PROBE	250 €	45 €
FLUORIMETER PROBE SULFORHODAMINE B	180 €	45 €
FLUORIMETER PROBE FLUORESCEIN	180 €	45 €
TURBIDITY PROBE	180 €	45 €
CHLOROPHYL A PROBE	180 €	45 €
CABLE 10M	20 €	5 €
CABLE 30M	60 €	15 €
BACKUP BATTERY (IF DURATION > 1 MONTH)	20 €	5 €
BATTERY CHARGER	20 €	5 €

** Supplied with SIM card and Webserver - Prices excluding insurance and transport*

APPLICATIONS AND GOALS

HYDROLOGICAL TRACING



APPLICATIONS	GOALS
ABSTRACTION OF GROUNDWATER / SPRING WATER	• Delimitation of a supply catch basin • Check that a determined point is found in the catch basin • Study of the respective inputs of different waters
PROTECTION AREAS OF UNDER-GROUND WATERS	• Check of an hydraulic connection between the injection and catch point • Study of transit times and flow velocity • Sizing of protection zones
SUPPLY AREAS OF RUN-OFFS	• Delimitation of feeding areas • Check that a given location is found in the feeding area of capture • Knowledge of underground inflows
RISKS ASSESSMENT INCIDENTS SIMULATION	• Check of a hydraulic connection and an installation/ a capture site • Assessment of the operational timing • Monitoring of implantation of the supervision point • Estimate of the size of the impacts during risk assessments • Simulation of the incidental effect causing infiltration of dangerous liquids in underground waters
CONTAMINATED SITES DUBIOUS AREAS	• Study of seepage runoff • Verification of the right place of sampling points downstream from a site
LANDFILLS	• Verification of outflows under existing landfills • Monitoring of seepage paths : meteoric waters flow towards foreseen drainages • Monitoring of waterproofing of cover layers • Assessment of sites for new landfills : e.g. verification that a site is away from a supply catch basin • Verification of the right spot of the surveillance point
INTERACTION SURFACE WATERS / GROUND WATERS	• Detection and localization of seepage or water flows exfiltration sections • Detection of outflows under water streams • Identification of drain places of closed lakes
DETECTION OF PARASITE WATERS	• Identification et quantification of the arrival to a seepage catch coming from a water stream • Verification of the arrival to a capture of close rainwater infiltrations
DRILLING / PIEZOMETER	• Control of the representativeness of underground water samples through tagging the drilling fluid • Control of leak-proof caps dividing various levels of catchment
EXPERT ASSESSMENT IN CASE OF DAMAGES	• Verification of the point of entry of waters seeping into a building
DETERMINATION OF AQUIFER PARAMETERS / MODELLING OF GROUND-WATER FLOWS	• Determination hydraulic parameters such as the outflow velocity and dispersion coefficient • Calculation of the storing volume from empty volumes allowing outflow • Adapt and validate outflow models and mass transport in solution form • Verifications of outflows directions predicted with respect to observed directions

IMPLEMENTATION OF TRACINGS

SOURCE CETRAHE

BEFORE THE REALIZATION OF A TRACING, SOME PRELIMINARY STEPS HAVE TO BE PLANNED :

STEP 1

The first is **to determine the objectives of the tracing:** reconnaissance tracing of underground circulation, simulation of pollution transfer, aquifer characterization test with the determination of hydrodispersive parameters (circulation speed, kinematic porosity, dispersivity), etc... This step is very important because the strategic choices that will be adopted thereafter will be a compromise between objectives and cost.

STEP 2

The 2nd step consists **in collecting a maximum of existing information, as well as documentation on previous tracings** (cf. article dedicated to the regional inventory). The collected information must include all geographical, topographical, geological, hydrogeological and anthropic data (water uses, catchments, etc...). As for previous tracings, even if they do not have a satisfactory reliability compared to today's evaluation criteria, they will be rich in information and very useful to avoid certain pitfalls.

STEP 3

The 3rd step is the **recognition of the site** where the tracing will be carried out. It consists in identifying potential injection points (direct access or via an unsaturated zone, absorption capacity, possibilities of loading and overflows, need for flushing, accessibility in particular to vehicles transporting water intended for flushing, etc.) and potential release points (catchments, uncaught sources, surface water outlets, operation, accessibility, possible flow measurement, etc.).
At the end of this visit, it is important to examine the feasibility of setting up the various monitoring devices (manual sampling, installation of automatic samplers, installation of fluorometer, attachment of activated carbon detectors, influence of pumping regimes, influence of chlorination, ...) and to anticipate the hydrological conditions which may be different (and vary) at the time of the test.

NOTE
IT IS ADVISABLE TO AVOID MULTI-TRACKING INVOLVING MORE THAN 3 TO 4 TRACERS, AT THE RISK OF USING LESS EFFICIENT TRACERS, AND CONFUSION IN THE MONITORING AND INTERPRETATION OF THE RESTITUTION CURVE(S).

AFTER HAVING APPROACHED THESE STEPS, ONE CAN THEN PROCEED TO THE DIMENSIONING OF THE TRACING.

Tracing or multi-tracing ?
A multi-tracing consists in simultaneously injecting different tracers at several injection points. It allows to answer several questions at the same time, to reduce the cost and to save a considerable amount of time. On the other hand, it imposes a judicious choice of the tracers used, sufficiently conservative in the context, and without presenting analytical interferences between them.

The choice of tracer(s) is particularly important for the dimensioning of multi-tracking, as it determines the final result according to its performance and also influences other strategic choices (quantity of injection and types of monitoring). A good knowledge of the physico-chemical properties of the tracer(s) as well as their behaviour according to the environment(s) allows to better adapt the tracer(s) to the geological, physical and hydrological context.

The quantity of tracer to be injected is always a delicate question. Several formulas exist, but they suppose an a priori knowledge of the environment and the parameters representing it, the ideal is to have already carried out a tracer in an equivalent context. The TRAC software (free of charge), in its «Simulation» section, allows to make estimates requiring the selection of the analytical solution adapted to the hydrogeological context, corresponding as well as possible to the transit of the tracer in the chosen tracing system.

In practice, the quantity is expertly estimated, taking into account the hydrogeological context. Between empiricism, intuition and experience, to decide the question, two determining elements must be taken into account: the dilution that the tracer should undergo, often approached by means of distance and the analytical performance of the tracer, and the monitoring modes.

TO BE NOTED :
THE TRACER CANNOT PROVIDE INFORMATION ON THE ENTIRE HYDROLOGICAL OR HYDROGEOLOGICAL SYSTEM. THE RESULTS REFER ONLY TO THE PART TESTED. TO EXTRAPOLATE TO ANOTHER PART OF THE AQUIFER IT IS NECESSARY TO BE CERTAIN OF THE HOMOGENEITY OF THE ENVIRONMENT.

Good practices involve the transmission of information prior to the tracing operation to the authorities (DDT, gendarmerie, etc.) and local residents (town hall). In particular, this makes it possible to avoid fears and alerts related to the coloring of the water, in the case of fluorescent tracers or dyes. Before any injection, it is necessary to take water samples of control samples, and if the protocol includes the use of activated carbon detectors, it is also necessary to provide for the immersion of «control» fluosensors at an appropriate frequency. For reconnaissance tracings, the realization in periods of high water generally makes it possible to benefit from more favorable conditions, because of faster flows, by preferentially targeting a period of receding water level. It is recommended to carry out the simulation tracings in contrasted hydrological conditions (low and high waters), because the results obtained can fluctuate in large proportions.

MONITORING AND ANALYSIS MODE

During a tracing operation, the analytical component is of great importance. A reliable interpretation can only be formulated from results based on strictly controlled measurements and analytical logic.

THE MODE OF TRACING AND ANALYSIS DEPENDS ON SEVERAL FACTORS :

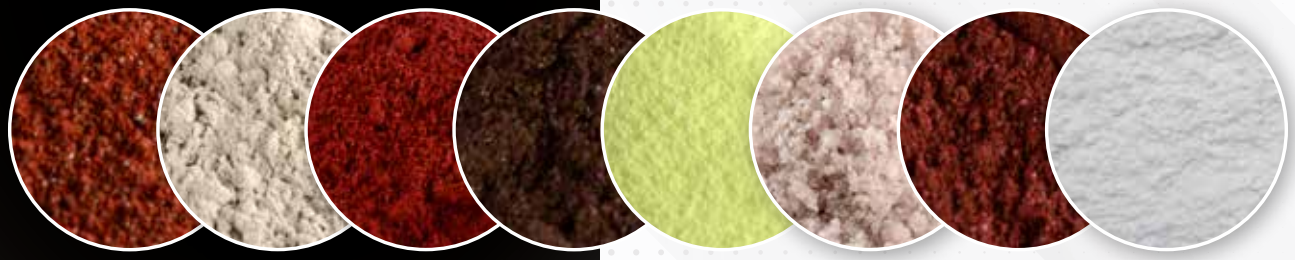
- Type(s) of tracer(s) used: fluorescent, saline, ... ;
- Type of water point(s) monitored: source, catchment, borehole, river,... ;
- possibilities of installation of equipment: available space, security, power supply, access,...) ;
- available budget.

The most reliable method of monitoring and analysis is water sampling with laboratory analysis. The laboratory equipment allows today the detection of substances in very low concentrations. For fluorescent tracers, laboratory spectrofluorometers (direct measurement of fluorescence) enable very low detection limits to be reached, of the order of 0.001 µg/L for uranine.

The spectral analysis carried out by a spectrofluorometer constitutes an essential diagnostic for the detection and interpretation of a trace, especially as the injection quantities are increasingly reduced in order to remain below the visibility threshold at the restitution points.

SPECTROFLUOROMETER

SOURCE : CETRAHE



Field instruments allowing in situ measurements also contribute to the improvement of tracer tracking. More and more efficient instruments are available: field fluorometers, specific electrodes, sensitive conductivity meters, etc. For fluorescent tracers, the use of a field fluorimeter can be very useful. **Easy to use, these devices allow to obtain results in near-real time, even in case of multi-tracking.** However, it is advisable to avoid using them as the only tracking device, especially for multi-tracking. Indeed, variations in the natural fluorescence of the recorded water, as well as interferences between tracers, can be misinterpreted as restitutions. It is therefore advisable to couple this monitoring with automatic or manual sampling, in order to check by spectral analysis in the laboratory the presence or not of the tracer.

As for the activated carbon detectors (fluosensors) sometimes used for fluorescent tracers, it is advisable to use them as a last resort, when field conditions do not allow for another mode of detection. They can also be used as a secondary means of detection to spatially broaden tracking in the framework of reconnaissance tracing, in surveillance of «secondary» points. However, caution should be exercised in interpreting the results obtained. Among the common tracers, tracking by fluorosensor can only be envisaged for tracers such as uranine or eosin, with a certain number of precautions (cf. technical note n°1 of CETRAHE). Red tracers (Rhodamine type) cannot be monitored by this method, since activated carbon has shown an inability to fix them under laboratory conditions at water concentrations below 30 µg/L. The fluorosensor method is also unsuitable for fluorescent tracers that emit in the blue (Sodium Naphthionate, Acid Amino.G., Tinopal).

Finally, ionic tracers (salts) can be determined with great analytical precision by different devices (Ion chromatography, spectrophotometry, atomic absorption spectroscopy, etc.). However, the natural presence of these ions in water parasites their detection in low concentrations, despite the performance of the apparatus used. The dosage of the injected quantity must therefore be particularly studied, so that it is high enough to be detected at the monitoring points and moderate enough not to disturb water uses (water catchments, natural environments).

DATA EXPLOITATION AND INTERPRETATION

The results of a tracing are illustrated by the plotter's restitution curve, giving the evolution of concentrations as a function of time, at the restitution point. The control of the flows at the point of restitution allows to calculate a restitution balance (restitution mass and percentage of restitution), and the Residence Time Distribution (RSD) which allows to describe the transit of the tracer in the tracing system.

The SDR corresponds to the probability density function which gives the probability that a tracer molecule has of staying in the system. It is indeed the distribution curve of the tracer cloud. When the injection can be assimilated to a «Dirac» impulse (i.e. a short injection), the SDR gives the impulse response of the tracer system for the hydrological conditions in which it is located at the time of tracing, (Lepiller M. & Mondain P-H, 1986). From the SDR, a number of parameters describing the tracer's transit can be calculated, such as mean residence time and apparent velocity. The interpretation of the results is different according to the objective. For reconnaissance tracings, the main objective is to accurately assert the belonging of an injection point to the impluvium of the karstic system. For quantitative (simulation) tracings, it is important to describe precisely the transit modalities of the tracer, as well as the hydrodispersive parameters for tracings in porous media. Analytical tools to help in the estimation of the parameters exist. The TRAC software, in «Interpretation» mode of the tracings, allows to interpret a tracing using different analytical solutions by adjusting the parameters of the solution and comparison with the observation data.

NOTE
INSTRUMENTAL DETECTION LIMITS SHOULD NOT BE CONFUSED WITH ACTUAL DETECTION LIMITS WHICH ARE HIGHLY DEPENDENT ON THE BACKGROUND NOISE LEVEL IN NATURAL WATERS AND VARY DEPENDING ON THE TRACER.

Finally, at the end of the tracing operation and the interpretation of the results, the operator is invited to enter the information in the tracing database entry application. This is the database, with a national vocation, dedicated to the banking of the data.

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Université d'ORLÉANS

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CELLULE R&D D'EXPERTISE ET DE TRANSFERT EN TRAÇAGES APPLIQUÉS À L'HYDROGÉOLOGIE ET À L'ENVIRONNEMENT

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PAVIQUA - FLUOTECHNIK
9A Parc d'activité Bel Air - 84300 LES TAILLADES
+33 (0)4 86 69 63 72
contact@fluotechnik.com

www.fluotechnik.com