

Chromium Trace

Principle

Chromium(VI) ions react with 1.5-diphenylcarbazide to form 1.5-diphenylcarbazone, which forms a red complex with chromium(VI).

Range of Application

Waste water, process analysis

Storage Information

The test reagents are stable at +2 to +8°C up to the expiry date given on the package.

Interferences

The ions listed in the table have been individually checked up to the given concentrations. Cumulative effects and the influence of other ions have not been determined by us. There is no interference from:

2000 mg/l: SO₄²⁻, Na⁺, K⁺, NO₃⁻

1000 mg/l: Cl⁻

125 mg/l: Ca²⁺

100 mg/l: Mg²⁺, NH₄⁺

50 mg/l: Zn²⁺, Ni²⁺, Co²⁺, Cd²⁺

25 mg/l: Ag⁺, Pb²⁺

10 mg/l: Cu²⁺, Fe³⁺

1 mg/l: Sn²⁺

Larger amounts of iron, copper, and reducing and oxidizing agents give low-bias results. Lead, mercury and tin give high-bias results. Undissolved chromium is not determined.

The measurement results must be subjected to plausibility checks (dilute and/or spike the water sample).

Special note

When total chromium is determined, in some rare cases water samples are turbid after the digestion stage. Such samples must be pretreated with the sample preparation set LYW 513.

Remarks

The concentration of chromium (III) is obtained mathematically from the difference between chromium (total) and chromium (VI).

pH/Temperature

The pH of the water sample must be between pH 3 and pH 9. The temperature of the water sample and reagents must be between 15 and 35°C.

Analytical Quality Assurance

addista is an analytical quality assurance system with which you can check the accuracy and precision of your analysis results at any time. Regular checks ensure that your measurement system is functioning properly and is being correctly operated, and reveal sample-specific interferences.

For trace analysis the standard solution has be diluted by a factor of **25**.

After dilution the following nominal values are obtained:

Standard	Range of confidence
0.02 mg/l chromium	0.018 – 0.022 mg/l chromium

Safety Advice

On grounds of quality and reliability, the analysis should be carried out only with original accessories.

CADAS 100 (LPG 185 / ≥ LPG 210)

If this test is not already stored in your instrument please ask your manufacturer for programming instructions.

Note

The introduction of the **DosiCap Zip**.

NB! Change of the procedure.

Data table



LCS 313

LP2W	07/1994
Cr-T-Trace • F ₁ = 0 • F ₂ = 0.27 • K = 0	
Cr-VI-Trace • F ₁ = 0 • F ₂ = 0.27 • K = 0	
CADAS 30/30S/50/50S	07/1994
Cr-T-Trace • λ: 543 nm • Pro.: 1 • F ₁ = 0 • F ₂ = 0.27 • K = 0	
Cr-VI-Trace • λ: 543 nm • Pro.: 1 • F ₁ = 0 • F ₂ = 0.27 • K = 0	
ISIS 6000/9000	07/1994
Cr-T-Trace • λ: 565 nm • Pro.: 1 • F ₁ = 0 • F ₂ = 0.35 • K = -0.004	
Cr-VI-Trace • λ: 565 nm • Pro.: 1 • F ₁ = 0 • F ₂ = 0.35 • K = -0.004	
CADAS 100 / LPG 185	07/1994
Cr-T-Trace • λ: 543 nm • F = 0.27	
Cr-VI-Trace • λ: 543 nm • F = 0.27	
CADAS 100 / ≥ LPG 210	07/1994
Cr-T-Trace • λ: 543 nm • F ₁ = 0.27	
Cr-VI-Trace • λ: 543 nm • F ₁ = 0.27	

Applies to DR 2800/3800/3900/5000/6000, LASA 30/100, ISIS 6000/9000, CADAS 30/30S/50/50S, XION 500, CADAS 200Basis, Combimodule

Chromium Trace Edition 04/2004

Determination of Total Chromium

Carefully remove the foil from the screwed-on **DosiCap Zip**. Unscrew the **DosiCap Zip**. Pipette into the cuvette test

	Sample cuvette	Blank-value cuvette
Water sample	4 ml	—
Distilled water	—	4 ml

Screw the **DosiCap Zip**, with the fluting at the top, back onto each cuvette and **shake firmly back and forth 2 or 3 times**. Heat in the thermostat at **100°C** for **60 min** and allow to cool down. Alternative:

- In the thermostat **HT 200 S**: heat cuvettes **15 min** in **standard program HT**.

Do not invert the cuvettes after digestion.
Allow to cool to room temperature.

If digested water samples are turbid and/or coloured, see under "Special note".

Screw **an orange coloured DosiCap B** (LCK 313 B) onto each cooled cuvette. Invert a few times. After **2 min** invert a few times more and transfer the contents to 50 mm semi-micro cuvettes. Thoroughly clean the outside of the cuvettes and evaluate.
Take care that there are no air bubbles!

Chromium Trace Edition 05/2006

Evaluation

1. Select menu "Stored Programs".
2. Select test number (see below) and touch "Start".
3. Insert blank-value cuvette (see procedure) and touch "Zero".
4. Insert sample cuvette and touch "Read".

Parameter	Test-No.	Meas. range
Total Chromium trace (Cr-T-Trace)	313	0.005 – 0.25 mg/l
Chromium VI trace (Cr-VI-Trace)	313	0.005 – 0.25 mg/l

Applies to DR 2800/3800/3900/5000/6000, LASA 30/100, ISIS 6000/9000, CADAS 30/30S/50/50S, XION 500, CADAS 200Basis, Combimodule

Chromium Trace Edition 04/2004

Determination of Chromium (VI)

Pipette into the cuvette test

	Sample cuvette	Blank-value cuvette
Water sample	4 ml	—
Distilled water	—	4 ml

Screw **an orange coloured DosiCap B** (LCK 313 B) onto each cuvette. Invert a few times. After **2 min** invert a few times more and transfer the contents to 50 mm semi-micro cuvettes. Thoroughly clean the outside of the cuvettes and evaluate.
Take care that there are no air bubbles!

Chromium Trace Edition 07/1994

Evaluation

1. Insert filter **535 nm**.
2. Select »Dr. Lange« mode.
3. Select test number (see below).
4. Control number must be **4**.
5. Insert blank-value cuvette (see procedure) and press blue key.
6. Insert sample cuvette and press green key.

Parameter	Test-No.	Meas. range
Total Chromium trace (Cr-T-Trace)	313	0.005 – 0.25 mg/l
Chromium VI trace (Cr-VI-Trace)	313	0.005 – 0.25 mg/l



Chromium Trace

Edition 07/1994

Evaluation

1. Check program control number:
 ___ : **38 (CADAS 200)**
 ___ : **32 (ISIS 6000/9000)** ⇒ Select »TEST« mode.
CADAS 30/50 ⇒ Select »TEST« mode.
LASA 100, XION 500 ⇒ Select »Dr. Lange« mode.
2. Select test number (see below).
3. Control number must be:
2 (CADAS 30/50)
4 (CADAS 200, LASA 100, XION 500)
7 (ISIS 6000/9000)
4. Insert blank-value cuvette (see procedure) and press blue key.
5. Insert sample cuvette and press green key.

Parameter	Test-No.	Meas. range
Total Chromium trace (Cr-T-Trace)	313	0.005 – 0.25 mg/l
Chromium VI trace (Cr-VI-Trace)	313	0.005 – 0.25 mg/l

Procedure



LCS 313

**Applies to LP1W, LP2W,
CADAS 100 (LPG 185) / (≥ LPG 210)**

Chromium Trace

Edition 04/2004

Determination of Total Chromium

Carefully remove the foil from the screwed-on **DosiCap Zip**. Unscrew the **DosiCap Zip**.
Pipette into the cuvette test

Water sample	4 ml
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Screw the **DosiCap Zip**, with the fluting at the top, back onto the cuvette and **shake firmly back and forth 2 or 3 times**. Heat in the thermostat at **100°C** for **60 min** and allow to cool down. Alternative:

- In the thermostat **HT 200 S**:
heat the cuvette **15 min** in **standard program HT**.

Do not invert the cuvette after digestion.
Allow to cool to room temperature.

If digested water samples are turbid and/or coloured, see under "Special note".

Insert the cooled sample cuvette as blank-value cuvette in the photometer (see evaluation).

Screw **an orange coloured DosiCap B** (LCK 313 B) onto the cooled cuvette. Invert a few times. After **2 min** invert a few times more and transfer the content to 50 mm semi-micro cuvette. Thoroughly clean the outside of the cuvette and evaluate.
Take care that there are no air bubbles!



Chromium Trace

Edition 07/1994

Evaluation

1. Select »TEST« mode.
2. Select test number (see below).
3. Control number must be **2**.
4. Insert blank-value cuvette (see procedure) and press key below »ZERO«.
5. Insert sample cuvette and press key below »MEAS.«.

Parameter	Test-No.	Meas. range
Total Chromium trace (Cr-T-Trace)	313	0.005 – 0.25 mg/l
Chromium VI trace (Cr-VI-Trace)	313	0.005 – 0.25 mg/l

Procedure



LCS 313

**Applies to LP1W, LP2W,
CADAS 100 (LPG 185) / (≥ LPG 210)**

Chromium Trace

Edition 04/2004

Determination of Chromium (VI)

Pipette into the cuvette test

	Sample cuvette	Blank-value cuvette
Water sample	4 ml	—
Distilled water	—	4 ml

Screw **an orange coloured DosiCap B** (LCK 313 B) onto each cuvette. Invert a few times. After **2 min** invert a few times more and transfer the contents to 50 mm semi-micro cuvettes. Thoroughly clean the outside of the cuvettes and evaluate.
Take care that there are no air bubbles!

Chromium Trace

Edition 07/1994

Evaluation

1. Insert filter **535 nm**.
2. Enter factor (see below) and store \uparrow .
3. Insert blank-value cuvette (see procedure) and press "Null" (zero) key.
4. Insert sample cuvette and press "Ergebnis mit Faktor" (result with factor) key.

Parameter	Factor	Meas. range
Total Chromium trace (Cr-T-Trace)	0.27	0.005 – 0.25 mg/l
Chromium VI trace (Cr-VI-Trace)	0.27	0.005 – 0.25 mg/l

Chromium Trace

Edition 07/1994

Evaluation

1. Insert program filter **535 nm**.
2. Press "Tests" key until display (see below) appears.
3. Control number must be **9**.
4. Insert blank-value cuvette (see procedure) and press "Null" (zero) key.
5. Insert sample cuvette and press "Ergebnis" (result) key.

Parameter	Display	Meas. range
Total Chromium trace (Cr-T-Trace)	Cr-T-Tr. LCK 313	0.005 – 0.25 mg/l
Chromium VI trace (Cr-VI-Trace)	Cr-6-Tr. LCK 313	0.005 – 0.25 mg/l

Chromium Trace

Edition 07/1994

Evaluation

1. Select »TEST« mode.
2. Select symbol (see below).
3. Check factors and measuring wavelength in memory »Mem« (**LPG 185**) or control number must be **2 (LPG 210)**.
4. Insert blank-value cuvette (see procedure) and press "NULL" (zero) key.
5. Insert sample cuvette and press "MESS" (measure) key.

Parameter	Symbol	Meas. range
Total Chromium trace (Cr-T-Trace)	313 SG	0.005 – 0.25 mg/l
Chromium VI trace (Cr-VI-Trace)	313 S	0.005 – 0.25 mg/l