

1.14552.0001

# Spectroquant® Chromate Cell Test

Cr

for the determination of chromium(VI) and total chromium

USEPA approved for wastewater

## 1. Method

In weakly phosphoric solution chromium(VI) ions react with diphenylcarbazide to form chromium(III) and diphenylcarbazone, which form a red-violet complex. This complex is determined photometrically.

The method is analogous to APHA 3500-Cr B and DIN 38405-24.

## 2. Measuring range and number of determinations

Measuring range	Number of determinations
0.05 - 2.00 mg/l Cr	25
0.11 - 4.46 mg/l CrO <sub>4</sub> <sup>2-</sup>	

For programming data for selected photometers / spectrophotometers see [www.service-test-kits.com](http://www.service-test-kits.com).

## 3. Applications

This test measures chromium(VI) present in the sample as chromate or dichromate ions. Samples must be decomposed by digestion before complex-bound chromium(III) occurring in waters or total chromium (sum of chromium(VI) and chromium(III)) can be measured (see section 6).

### Sample material:

Groundwater, surface water, and seawater  
Drinking water  
Industrial water  
Wastewater and percolating water

## 4. Influence of foreign substances

This was checked in solutions containing 1 and 0 mg/l Cr. The determination is not yet interfered with up to the concentrations of foreign substances given in the table.

Concentrations of foreign substances in mg/l or %					
Al <sup>3+</sup>	1000	Hg <sup>2+</sup>	1000	SiO <sub>3</sub> <sup>2-</sup>	1000
Ca <sup>2+</sup>	1000	Mg <sup>2+</sup>	1000	Zn <sup>2+</sup>	100
Cd <sup>2+</sup>	1000	Mn <sup>2+</sup>	1000	EDTA	0.1 %
CN <sup>-</sup>	100	NH <sub>4</sub> <sup>+</sup>	1000	Surfactants <sup>2)</sup>	1 %
Cr <sup>3+</sup>	100 <sup>1)</sup>	Ni <sup>2+</sup>	1000	COD (K-hydrogen phthalate)	200 <sup>3)</sup>
Cu <sup>2+</sup>	10	NO <sub>2</sub> <sup>-</sup>	100	Na-acetate	0.1 %
F <sup>-</sup>	1000	Pb <sup>2+</sup>	10	NaCl	10 % <sup>4)</sup>
Fe <sup>3+</sup>	100	PO <sub>4</sub> <sup>3-</sup>	1000	NaNO <sub>3</sub>	10 %
				Na <sub>2</sub> SO <sub>4</sub>	10 %

<sup>1)</sup> when determined without digestion

<sup>2)</sup> tested with nonionic, cationic, and anionic surfactants

<sup>3)</sup> for determination of total chromium



**A higher COD may impair the efficacy of the digesting mixture in the determination of total chromium and thus result in false-low readings. Up to a maximum of 300 mg/l COD, this can be avoided by adding 2 doses of reagent Cr-2K instead of 1.**

<sup>4)</sup> for determination of total chromium only 1 %

Reducing agents interfere with the determination.

## 5. Reagents and auxiliaries

### Please note the warnings on the packaging materials!

The test reagents are stable up to the date stated on the pack when stored closed at +15 to +25 °C.

### Package contents:

1 bottle of reagent Cr-1K  
1 bottle of reagent Cr-2K  
1 bottle of reagent Cr-3K  
25 reaction cells  
1 blue dose-metering cap  
1 sheet of round stickers for numbering the cells

### Other reagents and accessories:

MQuant™ Chromate Test, Cat. No. 110012,  
measuring range 3 - 100 mg/l CrO<sub>4</sub><sup>2-</sup> (1.3 - 45 mg/l Cr)  
MColorpHast™ Universal indicator strips pH 0 - 14, Cat. No. 109535  
Sodium hydroxide solution TitriPUR® 1 mol/l, Cat. No. 109137  
Sulfuric acid TitriPUR® 0.5 mol/l, Cat. No. 109072  
Chromate standard solution CertiPUR®, 1000 mg/l CrO<sub>4</sub><sup>2-</sup>, Cat. No. 119780  
Empty cells 16 mm with screw caps (25 pcs), Cat. No. 114724  
Thermoreactor  
Pipettes for pipetting volumes of 5.0 and 10 ml

## 6. Preparation

At the first use **replace the screw cap of the reagent bottle Cr-2K by the blue dose-metering cap.**

Hold the reagent bottle **vertically** and, at each dosage, press the slide **all the way** into the dose-metering cap. **Before each dosage** ensure that the slide is **completely retracted.**



**Reclose the reagent bottle with the screw cap at the end of the measurement series, since the function of the reagent is impaired by the absorption of atmospheric moisture.**

- Analyze immediately after sampling.
- Check the chromate content with the MQuant™ Chromate Test. Samples containing more than 1.00 mg/l Cr must be diluted with distilled water **prior** to digestion.
- The pH must be within the range 1 - 9.** Adjust, if necessary, with sodium hydroxide solution or sulfuric acid.
- Filter turbid samples.
- Digestion for the determination of total chromium (wear eye protection!):**

Pretreated sample	10 ml	Pipette into an empty cell.
Reagent Cr-1K	1 drop <sup>1)</sup>	Add and mix.
Reagent Cr-2K	1 dose <sup>2)</sup>	Add, <b>close the cell tightly</b> , and mix.

Heat the cell at 120 °C<sup>3)</sup> in the preheated thermoreactor for 60 min. Allow the closed cell to cool to room temperature in a test-tube rack.  
**Do not cool with cold water!**

<sup>1)</sup> **Hold the bottle vertically while adding the reagent!**

<sup>2)</sup> in the case of high COD values: 2 doses

<sup>3)</sup> A digestion temperature of 100 °C may result in false-low readings.

## 7. Procedure

Reagent Cr-3K	6 drops <sup>1)</sup>	Place into a reaction cell, close the cell tightly, and shake <b>vigorously</b> .
<b>Leave to stand for 1 min.</b>		
Pretreated sample (15 - 35 °C)	5.0 ml	Add with pipette, close the cell, and mix.
<b>Leave to stand for 1 min (reaction time)</b> , then measure the sample in the photometer.		

<sup>1)</sup> **Hold the bottle vertically while adding the reagent!**

### Notes on the measurement:

- For photometric measurement the cells must be clean. Wipe, if necessary, with a clean dry cloth.
- Measurement of turbid solutions yields false-high readings.
- The pH of the measurement solution must be within the range 1.0 - 3.0.
- The color of the measurement solution remains stable for at least 60 min.

## 8. Analytical quality assurance

recommended before each measurement series

To check the photometric measurement system (test reagents, measurement device, handling) and the mode of working, a dilute chromate standard solution containing 1.00 mg/l Cr (2.23 mg/l CrO<sub>4</sub><sup>2-</sup>) can be used. Sample-dependent interferences (matrix effects) can be determined by means of standard addition.

Additional notes see under [www.qa-test-kits.com](http://www.qa-test-kits.com).

### Characteristic quality data:

In the production control, the following data were determined in accordance with ISO 8466-1 and DIN 38402 A51:

Standard deviation of the method (mg/l Cr)	± 0.008
Coefficient of variation of the method (%)	± 0.80
Confidence interval (mg/l Cr)	± 0.02
Number of lots	37

### Characteristic data of the procedure:

Sensitivity: Absorbance 0.010 A corresponds to (mg/l Cr)	0.01
Accuracy of a measurement value (mg/l Cr)	max. ± 0.04

For quality and batch certificates for Spectroquant® test kits see the website.

## 9. Notes

- Reclose the reagent bottles immediately after use.
- Information on disposal can be obtained at [www.disposal-test-kits.com](http://www.disposal-test-kits.com).**

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[www.analytical-test-kits.com](http://www.analytical-test-kits.com)

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