

1.14770.0001
1.14770.0002

Spectroquant®

Manganese Test

Mn

1. Method

In alkaline solution manganese(II) ions react with an oxime to form a red-brown complex that is determined photometrically.

The method is analogous to DIN 38406-2.

2. Measuring range and number of determinations

Cell mm	Measuring range mg/l Mn	Number of determinations
50	0.010 - 2.000	250 (Cat. No. 1.14770.0002)
20	0.25 - 5.00	or
10	0.50 - 10.00	500 (Cat. No. 1.14770.0001)

For programming data for selected photometers / spectrophotometers see www.service-test-kits.com.

3. Applications

This test measures only manganese(II) ions.

Sample material:

Groundwater and surface water, seawater
Drinking water and mineral water
Spring water and well water
Nutrient solutions for fertilization
Soils after appropriate sample pretreatment

4. Influence of foreign substances

This was checked in solutions containing 6 and 0 mg/l Mn. 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 %					
Ag ⁺	100	Cr ₂ O ₇ ²⁻	10	Ni ²⁺	25
Al ³⁺	1000	Cu ²⁺	50	NO ₂ ⁻	1000
Ca ²⁺	1000	Fe ³⁺	50	Pb ²⁺	1000
Cd ²⁺	1000	Hg ²⁺	250	PO ₄ ³⁻	1000
CN ⁻	1000	Mg ²⁺	250	SiO ₃ ²⁻	1000
Cr ³⁺	0,1	NH ₄ ⁺	1000	Zn ²⁺	1000
				EDTA	1
				Surfactants ¹⁾	1000
				NaCl	20 %
				NaNO ₃	20 %
				Na ₂ SO ₄	20 %

¹⁾ tested with nonionic, cationic, and anionic surfactants

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:

Reagent Mn-1: 1 bottle (Cat. No. 1.14770.0002) or
2 bottles (Cat. No. 1.14770.0001)

Reagent Mn-2: 1 bottle

Reagent Mn-3: 1 bottle

1 AutoSelector

Other reagents and accessories:

Nitric acid 65 % for analysis EMSURE®, Cat. No. 100456

MQuant™ Manganese Test, Cat. No. 110080,

measuring range 2 - 100 mg/l Mn²⁺

MColorpHast™ Universal indicator strips pH 0 - 14, Cat. No. 109535

MColorpHast™ pH-indicator strips pH 7.5 - 14, Cat. No. 109532

Sodium hydroxide solution 1 mol/l TitriPUR®, Cat. No. 109137

Sulfuric acid 0.5 mol/l TitriPUR®, Cat. No. 109072

Spectroquant® CombiCheck 30, Cat. No. 114677

Pipette for a pipetting volume of 5.0 ml

Rectangular cells 10, 20, and 50 mm (2 of each), Cat. Nos. 114946, 114947, and 114944

Semi-microcells 50 mm (2 pcs), Cat. No. 173502

6. Preparation

- Analyze immediately after sampling. Otherwise preserve with nitric acid 65 % (1 ml nitric acid per 1 l of sample solution).
- Check the manganese content with the MQuant™ Manganese Test. Samples containing more than 10.00 mg/l Mn must be diluted with distilled water.
- The pH must be within the range 2 - 7. Adjust, if necessary, with sodium hydroxide solution or sulfuric acid.
- Filter turbid samples.

7. Procedure

Pretreated sample (10 - 25 °C)	5,0 ml	Pipette into a test tube.
Reagent Mn-1	4 drops ¹⁾	Add and mix. The pH must be approx. 11.5. Check with MColorpHast™ pH-indicator strips. Adjust the pH, if necessary, with sodium hydroxide solution.
Reagent Mn-2	2 drops ¹⁾	Add and mix.
Leave to stand for 2 min (reaction time A).		
Reagent Mn-3	2 drops ¹⁾	Add and mix.
Leave to stand for 2 min (reaction time B), then fill the sample into the cell, and measure in the photometer.		

¹⁾ Hold the bottle vertically while adding the reagent!

For measurement in the 50-mm cell both the sample volume as well as the quantities of reagents Mn-1, Mn-2, and Mn-3 must be doubled. Alternatively, the semi-microcell Cat. No. 173502 can be used.

Notes on the measurement:

- Certain photometers may require a blank (preparation as per measurement sample, but with distilled water instead of sample).
- 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 9.3 - 9.7.
- The color of the measurement solution remains stable for at least 60 min after the end of the reaction time B stated above.

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, Spectroquant® CombiCheck 30 can be used. Besides a **standard solution** with 1.000 mg/l Mn²⁺, this article also contains an **addition solution** for determining sample-dependent interferences (matrix effects).

Additional notes see under 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 (10-mm cell):

Standard deviation of the method (mg/l Mn)	± 0.037
Coefficient of variation of the method (%)	± 0.72
Confidence interval (mg/l Mn)	± 0.10
Number of lots	39

Characteristic data of the procedure:

	Measuring range mg/l Mn	
	0.010 - 2.000	0.50 - 10.00
Sensitivity: Absorbance 0.010 A corresponds to (mg/l Mn)	0.011	0.06
Accuracy of a measurement value (mg/l Mn)	max. ± 0.036	max. ± 0.18

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.

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