

Supelco®

1.14768.0001

MQuant®

## Manganese Test

Mn

## 1. Method

**Determination with color-disk comparator**

In alkaline solution manganese(II) ions react with an oxime to form a red-brown complex. The manganese concentration is measured **semiquantitatively** by visual comparison of the color of the measurement solution with the color fields of a color disk.

## 2. Measuring range and number of determinations

Measuring range / color-scale graduation	Number of determinations
0.3 - 0.7 - 1.3 - 2 - 3 - 4 - 5 - 7 - 10 mg/l Mn	120

## 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  
Boiler and boiler feed water, cooling water  
Wastewater and electroplating wastewater  
Nutrient solutions for fertilization  
Soils after appropriate sample pretreatment

## 4. Influence of foreign substances

This was checked individually in solutions containing 5 and 0 mg/l Mn. The determination is not yet interfered with up to the concentrations of foreign substances given in the table. Cumulative effects were not checked; such effects can, however, not be excluded.

Concentrations of foreign substances in mg/l or %							
Ag <sup>+</sup>	100	Cr <sub>2</sub> O <sub>7</sub> <sup>2-</sup>	10	Ni <sup>2+</sup>	25	EDTA	1
Al <sup>3+</sup>	1000	Cu <sup>2+</sup>	50	NO <sub>2</sub> <sup>-</sup>	1000	Surfactants <sup>1)</sup>	1000
Ca <sup>2+</sup>	1000	Fe <sup>3+</sup>	50	Pb <sup>2+</sup>	1000	NaCl	20 %
Cd <sup>2+</sup>	1000	Hg <sup>2+</sup>	250	PO <sub>4</sub> <sup>3-</sup>	1000	NaNO <sub>3</sub>	20 %
CN <sup>-</sup>	1000	Mg <sup>2+</sup>	250	SiO <sub>2</sub> <sup>2-</sup>	1000	Na <sub>2</sub> SO <sub>4</sub>	20 %
Cr <sup>3+</sup>	0.1	NH <sub>4</sub> <sup>+</sup>	1000	Zn <sup>2+</sup>	1000		

<sup>1)</sup> 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:**

2 bottles of reagent Mn-1  
1 bottle of reagent Mn-2  
1 bottle of reagent Mn-3  
1 graduated 6-ml plastic syringe  
2 test tubes with screw caps  
1 color-disk comparator

**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 Mn<sup>2+</sup>  
MQuant® Universal indicator strips pH 0 -14, Cat. No. 109535  
MQuant® 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  
Manganese standard Titrisol® for 1000 mg/l Mn<sup>2+</sup>, Cat. No. 109988  
MQuant® Flat-bottomed tubes with screw caps for MQuant® tests with color-disk comparator (12 pcs), Cat. No. 117988

**Refill pack:**

**Cat. No. 118460**

Manganese Test

Refill pack for 114768 and 114406

(Reagents **without technical accessories** for the number of determinations stated in section 2)

## 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 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 strongly turbid samples.

## 7. Procedure

	Measurement sample right-hand tube (A) behind the color disk	Blank left-hand tube (B) behind the color disk	
Pretreated sample (5 - 25 °C)	6 ml	6 ml	Inject into the test tube with the syringe.
Reagent Mn-1	8 drops <sup>1)</sup>	-	Add, close the tube, and mix.  <b>The pH must be approx. 11.5.</b> Check with MQuant® pH-indicator strips. Adjust the pH, if necessary, with sodium hydroxide solution.
Reagent Mn-2	4 drops <sup>1)</sup>	-	Add, close the tube, and mix.
<b>Leave to stand for 2 min (reaction time 1).</b>			
Reagent Mn-3	4 drops <sup>1)</sup>	-	Add, close the tube, and mix.
<b>Leave to stand for 10 min (reaction time 2).</b>			
Hold the comparator to the light, keeping it upright, and rotate the disk until the closest possible color match is achieved between the two large windows. Read off the result in mg/l Mn shown in the small window.			

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

**Notes on the measurement:**

- The color of the measurement solution remains stable for at least 60 min after the end of the reaction time 2 stated above.
- Turbidity in the measurement solution makes the color comparison more difficult.
- If the color of the measurement solution is equal to or more intense than the darkest color on the scale, repeat the measurement using **fresh**, diluted samples until a value of less than 10 mg/l Mn is obtained.  
Concerning the result of the analysis, the dilution (see also section 6) must be taken into account:

$$\text{Result of analysis} = \text{measurement value} \times \text{dilution factor}$$

## 8. Method control

To check test reagents, measurement device, and handling:  
Dilute the manganese standard with distilled water to 4 mg/l Mn<sup>2+</sup> and analyze as described in section 7.  
Additional notes see under [www.qa-test-kits.com](http://www.qa-test-kits.com).

## 9. Notes

- Reclose the reagent bottles immediately after use.
- Rinse the test tubes and the syringe **with distilled water only**.
- Information on disposal can be obtained at [www.disposal-test-kits.com](http://www.disposal-test-kits.com).**

