Supelco®

1.14406.0001
1.14406.0007

MQuant®

Manganese Test

Mn

1. Method

Determination with color-card 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 card.

2. Measuring range and number of determinations

Measuring range / color-scale graduation	Number of determinations
0.03 - 0.06 - 0.10 - 0.15 - 0.20 - 0.25 - 0.3 - 0.4 - **0.5 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
Electroplating wastewater
Nutrient solutions for fertilization
Soils after appropriate sample pretreatment

4. Influence of foreign substances

This was checked individually in solutions containing 0.25 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^+	100	Cu^{2+}	50	NO_2^-	1000	**EDTA**	**1**
Al^{3+}	1000	F^-	1000	Pb^{2+}	1000	Surfactants[1]	1000
Ca^{2+}	1000	Fe^{3+}	50	PO_4^{3-}	1000	NaCl	20 %
Cd^{2+}	1000	Hg^{2+}	250	SiO_3^{2-}	1000	$NaNO_3$	20 %
CN^-	1000	Mg^{2+}	250	SO_3^{2-}	1000	Na_2SO_4	20 %
Cr^{3+}	**0.1**	NH_4^+	1000	Zn^{2+}	1000		
$Cr_2O_7^{2-}$	**10**	Ni^{2+}	25				

[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:
2 bottles of reagent Mn-1
1 bottle of reagent Mn-2
1 bottle of reagent Mn-3
2 test tubes with screw caps (in comparator block)
1 color card usable for Cat. Nos. 1.14406.0001 **and** 1.14406.0007

Other reagents and accessories:
Nitric acid 65 % for analysis EMSURE®, Cat. No. 100456
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^{2+}, Cat. No. 109988

MQuant® Flat-bottomed long tubes with screw caps for MQuant® tests with color-card comparator (12 pcs), Cat. No. 114901

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).
- **The pH must be within the range 2 - 7.**
  Adjust, if necessary, with sodium hydroxide solution or sulfuric acid.
- Filter turbid samples.

7. Procedure

Open the box and set up with both test tubes **on the left**.
Unfold the color card and insert it, colored end first, into the slit at the lower **right-hand** edge of the box.

	Measurement sample tube nearer to the tester (**A**)	**Blank** tube farther from the tester (**B**)	
Pretreated sample (**5 - 25 °C**)	20 ml	20 ml	Fill the test tube to the mark (= 20 ml).
Reagent Mn-1	8 drops[1]	-	Add, close the tube, and mix. **The pH must be approx. 11.5.** Check with MQuant® pH-indicator strips. Adjust the pH, if necessary, with sodium hydroxide solution.
Reagent Mn-2	4 drops[1]	-	Add, close the tube, and mix.
Leave to stand for 2 min (reaction time 1).			
Reagent Mn-3	4 drops[1]	-	Add, close the tube, and mix.
Leave to stand for 10 min (reaction time 2).			

Slide the color card through to the left until the closest possible color match is achieved between the two open test tubes when viewed from above.
Read off the result in mg/l Mn from the color card at the lower right-hand edge of the box.

[1] **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 0.5 mg/l Mn is obtained.
  Concerning the result of the analysis, the dilution must be taken into account:

Result of analysis = measurement value x dilution factor

8. Method control

To check test reagents, measurement device, and handling:
Dilute the manganese standard with distilled water to 0.25 mg/l Mn^{2+} and analyze as described in section 7.
Additional notes see under **www.qa-test-kits.com**.

9. Notes

- Reclose the reagent bottles immediately after use.
- Rinse the test tubes **with distilled water only**.
- **Information on disposal can be obtained at www.disposal-test-kits.com.**

Merck KGaA, 64271 Darmstadt, Germany,
Tel. +49(0)6151 72-2440
www.analytical-test-kits.com

EMD Millipore Corporation, 400 Summit Drive
Burlington MA 01803, USA, Tel. +1-978-715-4321