



Manganese Test Kit

MN-PAN (2350800)

DOC326.97.00066

Test preparation

CAUTION: ⚠ *Review the Safety Data Sheets (MSDS/SDS) for the chemicals that are used. Use the recommended personal protective equipment.*

- Put the color disc on the center pin in the color comparator box (numbers to the front).
- Use sunlight or a lamp as a light source to find the color match with the color comparator box.
- Rinse the tubes with sample before the test. Rinse the tubes with deionized water after the test.
- This test is very sensitive to contamination. For best results, clean all glassware with 1:1 nitric acid solution, then rinse fully with deionized water.
- If the sample contains hardness of more than 300 mg/L as CaCO_3 , add 10 drops of Rochelle salt solution after step 3 of the test procedure.
- If the color match is between two segments, use the value that is in the middle of the two segments.
- If the color disc becomes wet internally, pull apart the flat plastic sides to open the color disc. Remove the thin inner disc. Dry all parts with a soft cloth. Assemble when fully dry.
- To verify the test accuracy, use a standard solution as the sample. Prepare a 0.5 mg/L-manganese standard solution as follows. Use a pipet to add 2.0 mL of a 25-mg/L manganese standard solution into a 100-mL volumetric flask. Dilute to the mark with deionized water. Mix well.
- To determine total manganese, digest the sample with heat and acid. Refer to the *Water Analysis Guide* for more information.
- If the sample is very acidic or alkaline, adjust the sample pH to 4–5 with sodium hydroxide or sulfuric acid solution. Make sure that the pH is not more than 5 to prevent a manganese precipitate.
- To use the included demineralizer bottle, fill the bottle with tap water and shake to mix. Use the water from the demineralizer bottle as deionized water in the test procedure. Fill the bottle again when empty. Replace the resin after the bottle is filled approximately 100 times.
- The alkaline cyanide solution contains cyanide. Make sure to read the Safety Data Sheets and obey the safety precautions.
- Dispose of reacted solutions according to local, state and federal regulations. Refer to the Safety Data Sheets for disposal information for unused reagents. Refer to the environmental, health and safety staff for your facility and/or local regulatory agencies for further disposal information.

Replacement items

Description	Unit	Item no.
Alkaline Cyanide Reagent	100 mL MDB	2122332
Ascorbic Acid Powder Pillows, 25 mL	100/pkg	1457799
PAN Indicator Solution, 0.1%	100 mL MDB	2122432
Bottle, square, with 25-mL mark	each	1704200
Color disc, manganese, PAN, 0–0.7 mg/L	each	9266200
Color comparator box	each	173200
Demineralizer bottle, 177-mL capacity	each	1429900
Glass viewing tubes, 18 mm	6/pkg	173006

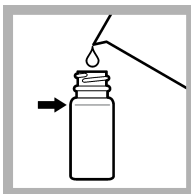
Optional items

Description	Unit	Item no.
Ampule Breaker, 2-mL PourRite® Ampules	each	2484600
Flask, volumetric, Class A, 100 mL	each	1457442
Manganese Standard Solution, 2-mL PourRite® Ampule, 25 mg/L	20/pkg	2112820
Nitric acid solution, 1:1	500 mL	254049
Pipet, volumetric, Class A, 2 mL	each	1451536
Pipet filler	each	1218900
Rochelle salt solution	29 mL DB	172533
Sodium hydroxide standard solution, 5.0 N	100 mL MDB	245032
Sulfuric acid standard solution, 5.25 N	100 mL MDB	244932

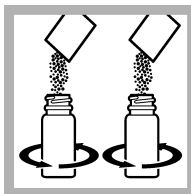
Test procedure—Manganese (0–0.7 mg/L Mn)



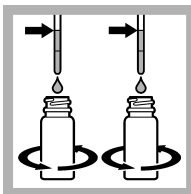
1. Fill a bottle to the 25-mL mark with deionized water (or pretreated sample).



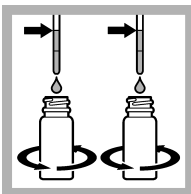
2. Fill a second bottle to the 25-mL mark with sample.



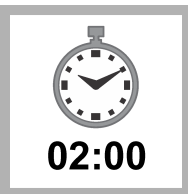
3. Add one Ascorbic Acid Reagent Powder Pillow to each bottle. Swirl to mix.



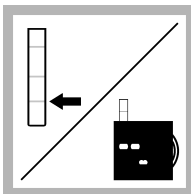
4. Add 1 mL of Alkaline-Cyanide Reagent to each bottle. Swirl to mix.



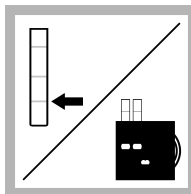
5. Add 1 mL of PAN Indicator Solution to each bottle. Swirl to mix. An orange color develops.



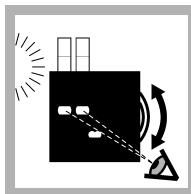
6. Wait 2 minutes. Wait 10 minutes if the sample contains more than 5 mg/L of iron.



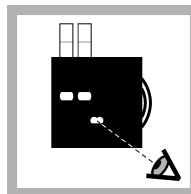
7. Fill a tube to the first line (5 mL) with water from the first bottle. Put the tube into the left opening of the color comparator box.



8. Fill a second tube to the first line (5 mL) with the prepared sample. Put the second tube into the color comparator box.



9. Hold the color comparator box in front of a light source. Turn the color disc to find the color match.



10. Read the result in mg/L in the scale window.

Interferences

Interfering substance	Interference level
Aluminum	20 mg/L
Cadmium	10 mg/L
Calcium	1000 mg/L as CaCO ₃
Cobalt	20 mg/L
Copper	50 mg/L
Hardness	For samples that contain more than 300 mg/L hardness as CaCO ₃ , add 10 drops of Rochelle Salt Solution to the sample after the Ascorbic Acid Powder Pillow is added.
Iron	25 mg/L (If the sample contains more than 5 mg/L iron, increase the reaction time to 10 minutes.)
Lead	0.5 mg/L
Magnesium	300 mg/L as CaCO ₃
Nickel	40 mg/L
Zinc	15 mg/L

