**Manganese LR PP****M242****0.01 - 0.7 mg/L Mn****Mn1****PAN**

## Instrument specific information

The test can be performed on the following devices. In addition, the required cuvette and the absorption range of the photometer are indicated.

Instrument Type	Cuvette	$\lambda$	Measuring Range
MD 100, MD 600, MD 610, MD 640, MultiDirect	ø 24 mm	560 nm	0.01 - 0.7 mg/L Mn
SpectroDirect, XD 7000, XD 7500	ø 24 mm	558 nm	0.01 - 0.7 mg/L Mn

## Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
VARIO Manganese Reagent, Set Low Range F10	1 pc.	535090
Vario Rochelle Salt Solution, 30 ml <sup>*)</sup>	30 mL	530640

## Application List

- Galvanization
- Drinking Water Treatment
- Raw Water Treatment

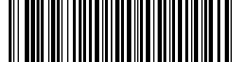
## Preparation

1. All lab glassware must first be rinsed with diluted nitric acid and then rinsed with deionised water.
2. Strongly buffered water samples or extreme pH values may exceed the buffering capacity of the reagents and pH values to be adjusted.  
If samples were acidified for storing, the pH value must be adjusted between 4 and 5 with 5 mol/l (5 N) Sodium hydroxide before the test. A pH value of 5 must not be exceeded, since this can lead to precipitation of manganese.



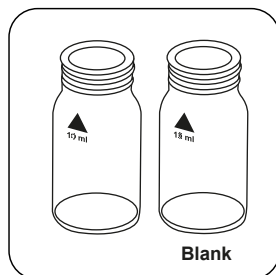
## Notes

1. If water samples contain more than 300 mg/L  $\text{CaCO}_3$  hardness, then after adding the Vario Ascorbic Acid powder pack, add an additional 10 drops of Rochelle Salt Solution.
2. After addition of the reagent solution "Alkaline-Cyanide" a cloudy or turbid solution may form in some water samples. Adding the PAN indicator solution should resolve the turbidity.
3. If the sample contains large amounts of iron (from 5 mg/L) a reaction period of 10 minutes must be adhered to.

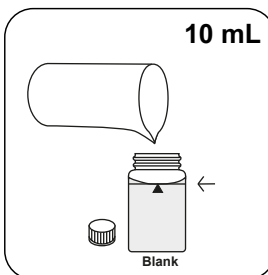


## Determination of Manganese LR with Vario Powder Packs

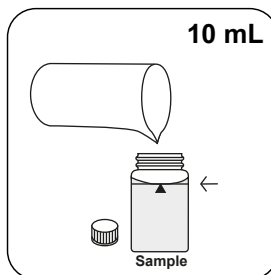
Select the method on the device.



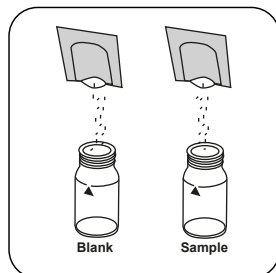
Prepare two clean 24 mm vials. Mark one as a blank.



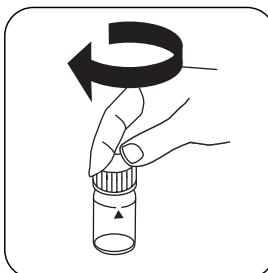
Put **10 mL deionised water** in the blank.



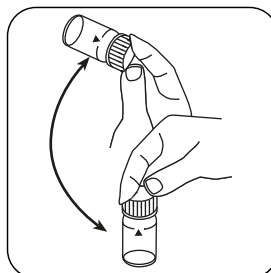
Put **10 mL sample** in the sample vial.



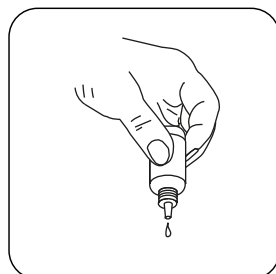
Add a **Vario Ascorbic Acid powder pack** in each vial.



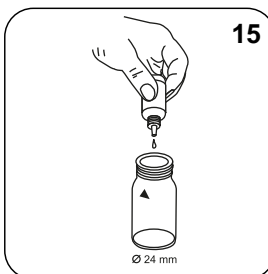
Close vial(s).



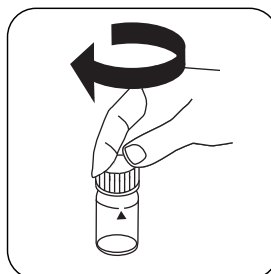
Invert several times to mix the contents.



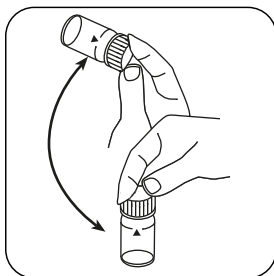
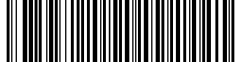
Hold cuvettes vertically and add equal drops by pressing slowly.



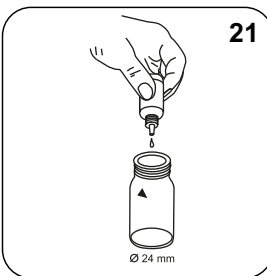
Add **15 drops Alkaline-Cyanide Reagent**.



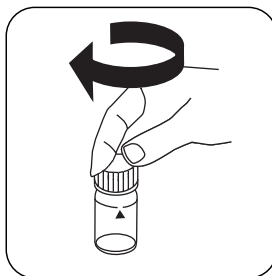
Close vial(s).



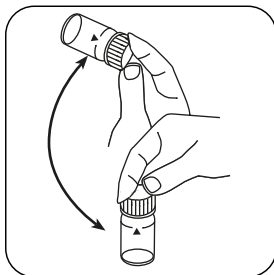
Invert several times to mix the contents.



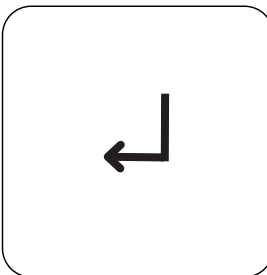
Add **21 drops PAN Indicator.**



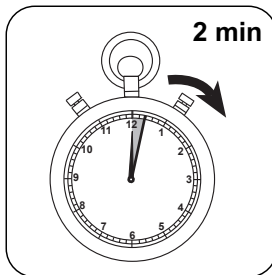
Close vial(s).



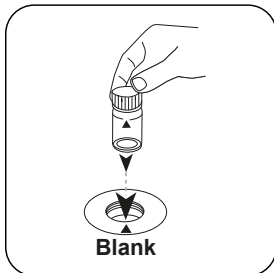
Invert several times to mix the contents.



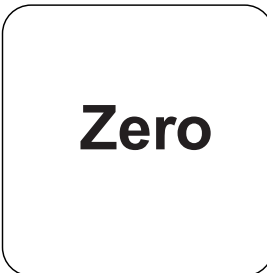
Press the **ENTER** button.



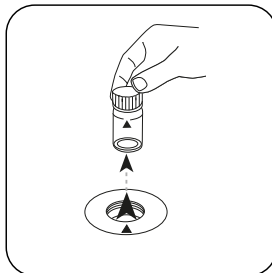
Wait for **2 minute(s) reaction time.**



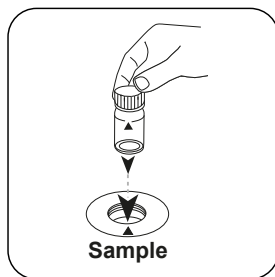
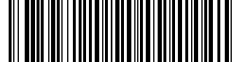
Place **blank** in the sample chamber. Pay attention to the positioning.



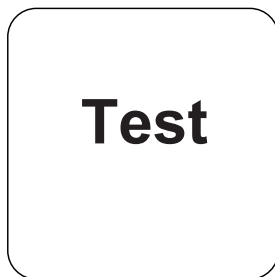
Press the **ZERO** button.



Remove the vial from the sample chamber.

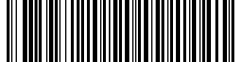


Place **sample vial** in the sample chamber. Pay attention to the positioning.



Press the **TEST** (XD: **START**) button.

The result in mg/L Manganese appears on the display.



## Analyses

The following table identifies the output values can be converted into other citation forms.

Unit	Cite form	Scale Factor
mg/l	Mn	1
mg/l	MnO <sub>4</sub>	2.17
mg/l	KMnO <sub>4</sub>	2.88

## Chemical Method

PAN

## Appendix

### Calibration function for 3rd-party photometers

Conc. =  $a + b \cdot \text{Abs} + c \cdot \text{Abs}^2 + d \cdot \text{Abs}^3 + e \cdot \text{Abs}^4 + f \cdot \text{Abs}^5$

	ø 24 mm	□ 10 mm
a	$-3.05268 \cdot 10^{-2}$	$-3.05268 \cdot 10^{-2}$
b	$7.28484 \cdot 10^{-1}$	$1.56624 \cdot 10^{-0}$
c		
d		
e		
f		

### Bibliography

Goto, K., et al., Talanta, 24, 652-3 (1977)

<sup>h)</sup> additionally required for samples with hardness values above 300 mg/l CaCO<sub>3</sub>