

**Copper VLR PP****M152****2 - 210 µg/L Cu****Porphyrine Indicator****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.

<b>Instrument Type</b>	<b>Cuvette</b>	<b>λ</b>	<b>Measuring Range</b>
MD 600, MultiDirect	ø 24 mm	430 nm	2 - 210 µg/L Cu
SpectroDirect, XD 7000, XD 7500	ø 24 mm	425 nm	2 - 210 µg/L Cu
MD50	ø 24 mm	415 nm	2 - 210 µg/L Cu

**Material**

Required material (partly optional):

<b>Reagents</b>	<b>Packaging Unit</b>	<b>Part Number</b>
VARIO Copper, Set F10	1 Set	535140

**Application List**

- Waste Water Treatment

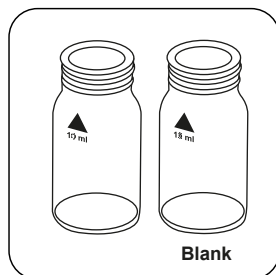
**Notes**

1. For most accurate results, a reagent blank measurement should be performed.
2. The pH of the sample has to be adapted by addition of sodium hydroxide solution or salpetric acid to a range 2-6 before starting the measurement.

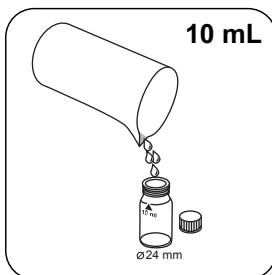


## Determination of Copper VLR with powder packs

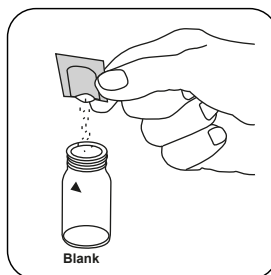
Select the method on the device.



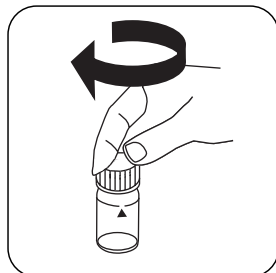
Prepare two clean 24 mm vials. Mark one as a blank.



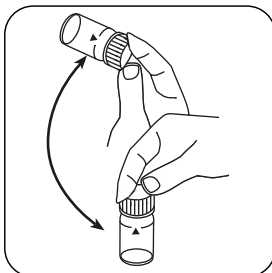
Place **10 mL sample** in each vial.



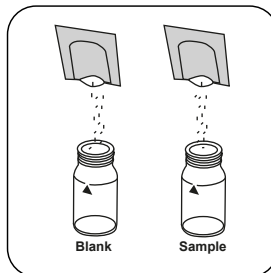
Add a **CU3 Masking F10 powder pack** to the blank.



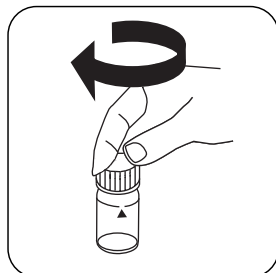
Close vial(s).



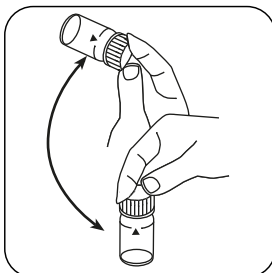
Swirl around to dissolve the powder.



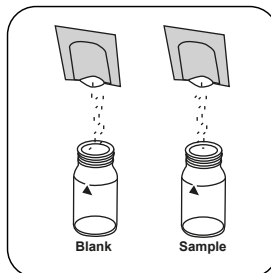
Add a **CU1 Porphyrin F10 powder pack** in each vial.



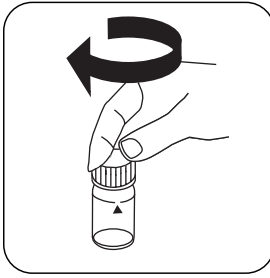
Close vial(s).



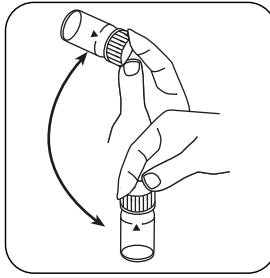
Swirl around to dissolve the powder.



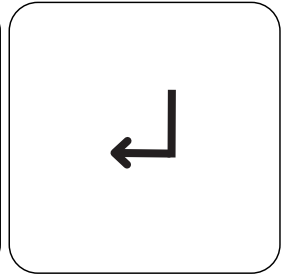
Add a **CU2 Porphyrin F10 powder pack** in each vial.



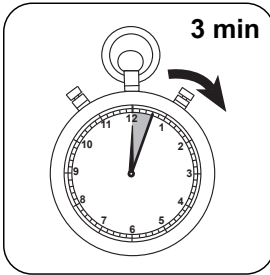
Close vial(s).



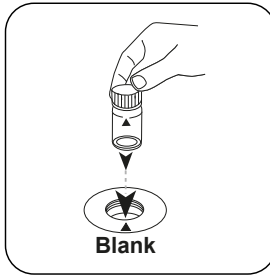
Swirl around to dissolve the powder.



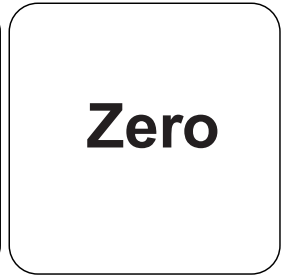
Press the **ENTER** button.



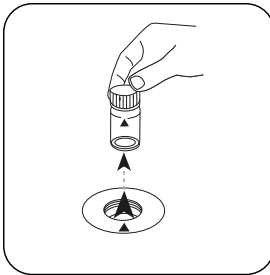
Wait for **3 minute(s) reaction time**.



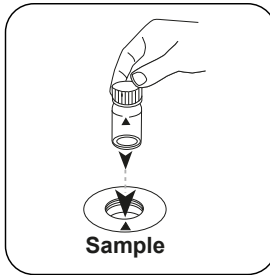
Place **blank** in the sample chamber. Pay attention to the positioning.



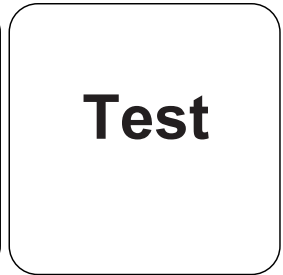
Press the **ZERO** button.



Remove the vial from the sample chamber.



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



Press the **TEST** button.

The result in **µg/L** Copper appears on the display.

## Chemical Method

Porphyrine Indicator

### Calibration function for 3rd-party photometers

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

	∅ 24 mm	□ 10 mm
a	$1.6957 \cdot 10^{+0}$	$1.6957 \cdot 10^{+0}$
b	$1.5650 \cdot 10^{+2}$	$3.3647 \cdot 10^{+2}$
c		
d		
e		
f		

## Interferences

### Persistent Interferences

1. Complexing substances can interfere in any concentration.

Interference	from / [mg/L]
Al <sup>3+</sup>	60
Cd <sup>2+</sup>	10
Ca <sup>2+</sup>	15000
Cl <sup>-</sup>	90000
Cr <sup>6+</sup>	110
Co <sup>2+</sup>	100
F <sup>-</sup>	30000
Pb <sup>2+</sup>	3
Mg <sup>2+</sup>	10000
Mn	140
Mo	11
Ni <sup>2+</sup>	60
K <sup>+</sup>	60000
Na <sup>+</sup>	90000
Zn <sup>2+</sup>	9
Fe	6
Hg	3

## Method Validation

<b>Limit of Detection</b>	2.6 µg/L
<b>Limit of Quantification</b>	7.9 µg/L
<b>End of Measuring Range</b>	210 µg/L
<b>Sensitivity</b>	156 µg/L/Abs
<b>Confidence Intervall</b>	5.5 µg/L
<b>Standard Deviation</b>	2.3 µg/L
<b>Variation Coefficient</b>	2.2 %