



Phosphonate PP

M316

0.02 - 125 mg/L PO₄

Persulfate UV Oxidation Method

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	λ	Measuring Range
MD 600, MD 610, MD 640, MultiDirect	ø 24 mm	660 nm	0.02 - 125 mg/L PO ₄
SpectroDirect, XD 7000, XD 7500	ø 24 mm	890 nm	0.02 - 125 mg/L PO ₄

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Phosphonate Set	1 Set	535220

The following accessories are required.

Accessories	Packaging Unit	Part Number
UV Pen Lamp, 254 nm	1 pc.	400740
UV protection glasses, orange	1 pc.	400755

Application List

- Cooling Water

Preparation

1. All glassware must first be rinsed with diluted Hydrochloric acid (1:1) and then rinsed with deionised water. Do not use detergents with phosphates.



Notes

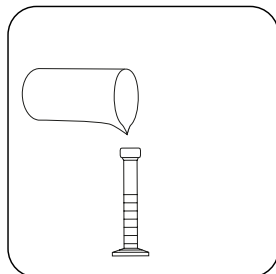
1. During UV digestion Phosphonates are converted to ortho-Phosphates. This step is normally completed in 10 minutes. Organic highly-loaded samples or a weak UV lamp can cause incomplete phosphate conversion to take place.
2. UV lamp available on request.
3. For handling of the UV lamp see manufacturer's manual. Do not touch the surface of the UV lamp. Fingerprints will erode the glass. Wipe the UV lamp with a soft and clean cloth between measurements.
4. The reagent Vario Phosphate Rgt. F10 is not completely dissolved.
5. The given reaction time of 2 minutes refers to a sample temperature of more than 15 °C. At a sample temperature lower than 15 °C, a reaction time of 4 minutes is required.



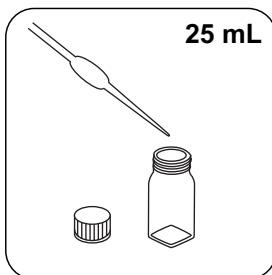
Digestion

Select the appropriate volume of sample according to the following table:

Expected measuring range (mg/L Phosphonate)	Sample volume in mL	Factor
0 - 2.5	50	0.1
0 - 5.0	25	0.2
0 - 12.5	10	0.5
0 - 25	5	1.0
0 - 125	1	5.0



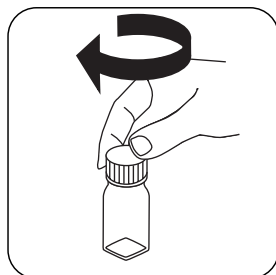
With the selected sample volume fill a 50 mL measuring cylinder. If necessary, fill up with demineralised water to 50 mL and mix.



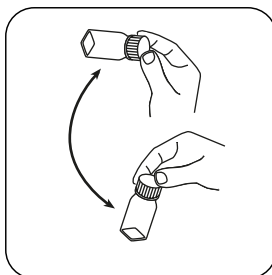
Fill one of the digestion vials with **25 mL of prepared sample**.



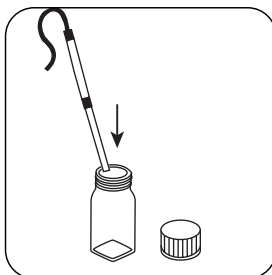
Add **Vario Potassium Persulfate F10 powder pack**.



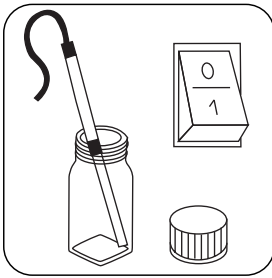
Close digestion vial



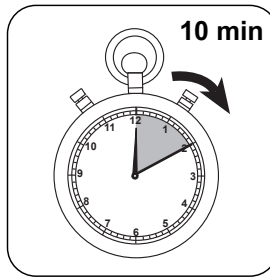
Swirl around to dissolve the powder.



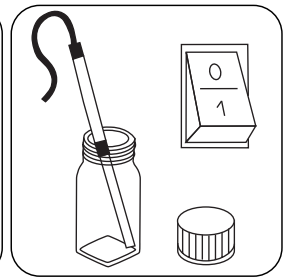
Keep the UV lamp in the sample. **Note: wear UV safety goggles!**



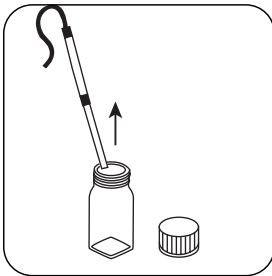
Turn on the UV lamp.



Wait for **10 minute(s) reaction time.**



The UV lamp is switched off when the countdown is finished.



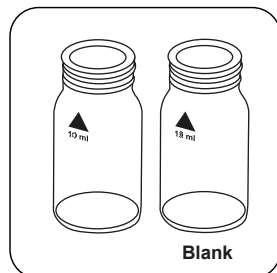
Remove the UV lamp from the sample.



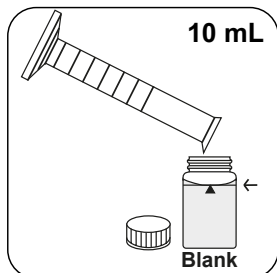
Determination of Phosphonate Persulphate-UV oxidation method with Vario Powder Packs

Select the method on the device.

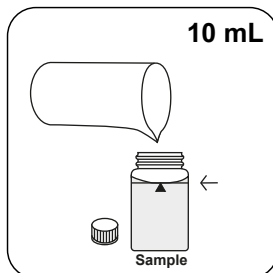
For testing of **Phosphonate with powder packs**, carry out the described **digestion**.



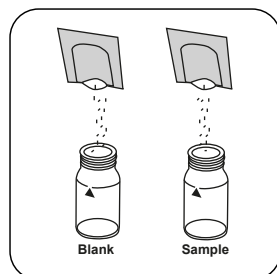
Prepare two clean 24 mm vials. Mark one as a blank.



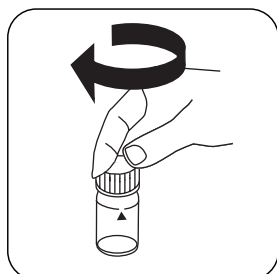
Fill blank with **10 mL prepared, not digested sample**.



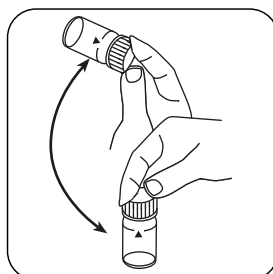
Fill sample vial with **10 mL prepared, digested sample**.



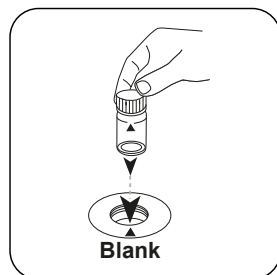
Add a **Vario Phosphate Rgt. F10 powder pack** in each vial.



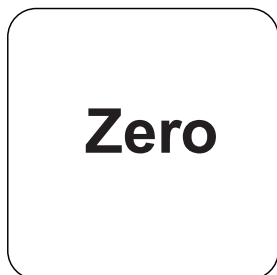
Close vial(s).



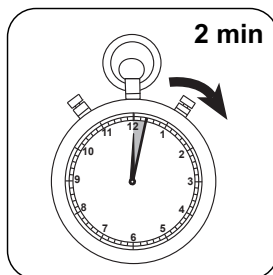
Invert several times to mix the contents (30 sec.).



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

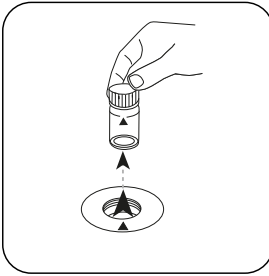


Press the **ZERO** button.

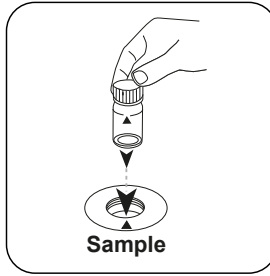


Wait for **2 minute(s) reaction time**.

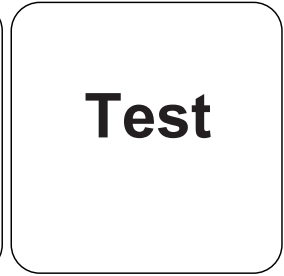
Once the reaction period is finished, the measurement takes place automatically.



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 PO_4^{3-} 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	PBTC	2.84
mg/l	NTP	1.05
mg/l	HEDPA	1.085
mg/l	EDTMPA	1.148
mg/l	HMDTMPA	1.295
mg/l	DETPMPA	1.207

Chemical Method

Persulfate UV Oxidation Method

Appendix

Calibration function for 3rd-party photometers

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

	∅ 24 mm	□ 10 mm
a	$-9.32417 \cdot 10^{-1}$	$-9.32417 \cdot 10^{-1}$
b	$1.93355 \cdot 10^{-1}$	$4.15713 \cdot 10^{-1}$
c		
d		
e		
f		

Interferences

Interference	from / [mg/L]	Influence
Aluminium (from 100 mg/l)	1000	
Arsenic	in all concentrations	Positive interference of similar magnitude
Benzotriazoles	10	
HCO_3^-	1000	
Br ⁻	100	

Interference	from / [mg/L]	Influence
Ca	5000	
CDTA	100	
Cl ⁻	5000	
CrO ₄ ²⁻	100	
Cu	100	
CN ⁻	100	
Diethanoldithiocarbamate	50	
EDTA	100	
Fe	200	
NO ₃ ⁻	200	
NTA	250	
PO ₄ ³⁻	15	
Phosphites, organic phosphorus compounds	Large quantities	Meta- and polyphosphates do not interfere
SiO ₂	500	
Si(OH) ₄	100	
SO ₄ ²⁻	2000	
S ²⁻	in all quantities	
SO ₃ ²⁻	100	
Thiourea (from 10 mg / l)	10	
Heavily buffered sample or samples with extreme pH values		May exceed the buffer capacity of the reagents

Bibliography

Blystone, P., Larson, P., A Rapid Method for Analysis of Phosphate Compounds, International Water Conference, Pittsburgh, PA. (Oct 26-28, 1981)

According to

Standard Method 4500-P I