Phosphate g. VARIO TT 326

0.02 - 1.1 mg/l P[b)]

Phosphomolybdenum Blue

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 16 mm	660 nm	0.02 - 1.1 mg/l P[b)]
SpectroDirect, XD 7000, XD 7500	ø 16 mm	890 nm	0.02 - 1.1 mg/l P[b)]

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Phosphate, Total Set	1 Set	535210

Application List

- Waste Water Treatment
- Drinking Water Treatment
- Raw Water Treatment

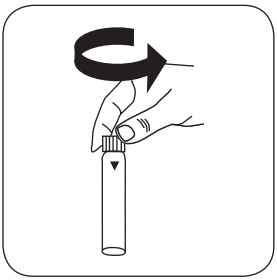
Preperation

1. Strongly buffered samples or samples with extreme pH values should be adjusted to between pH 6 and pH 7 before the analysis (use 1 mol/l Sulphuric acid or 1 mol/l Sodium hydroxide).
2. Ortho-Phosphate ions react with the reagent to form an intense blue colour. Phosphate, which is found in organic and condensed, inorganic (meta-, pyro- and polyphosphate) forms, must therefore be converted into ortho-phosphate ions prior to analysis. The pretreatment of the sample with acid and heat creates the conditions for the hydrolysis of the condensed, inorganic forms. Organically bound phosphate can be converted into ortho-phosphate ions by heating with acid and Persulphate. The amount of organically bound phosphate can be calculated:
   mg/l organic Phosphate = mg/l Phosphate, total - mg/l Phosphate, can be hydrolysed in acid.

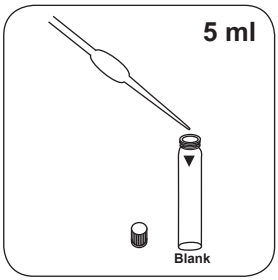
Notes

1. The reagent Vario Phosphate Rgt. F10 is not completely dissolved.

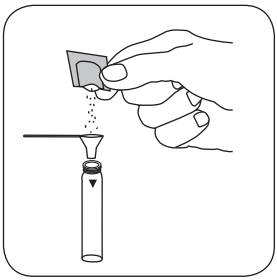
Digestion



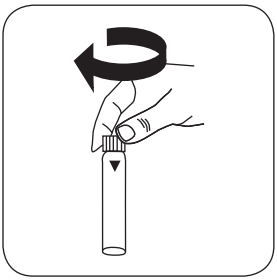
Open a digestion vial **PO_4-P Acid Reagent**.



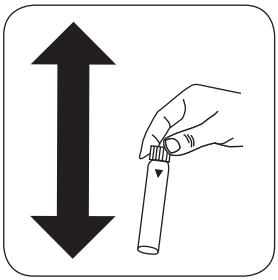
Put **5 ml sample** in the vial.



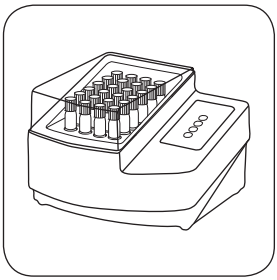
Add **Vario Potassium Persulfate F10 powder pack**.



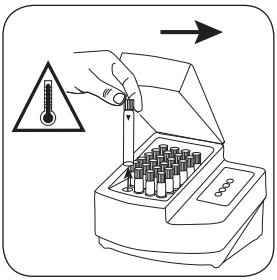
Close vial(s).



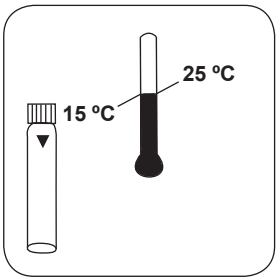
Mix the contents by shaking.



Seal the vials in the preheated thermoreactor for **30 minutes at 100 °C** .



Remove the vial from the thermoreactor. **Note: vial will be hot!)**

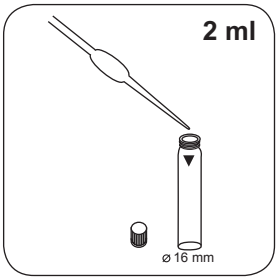


Allow the sample to cool to room temperature.

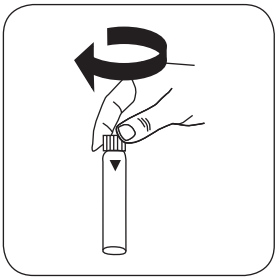
Implementation of the provision Phosphate, total with Vario Vial Test

Select the method on the device

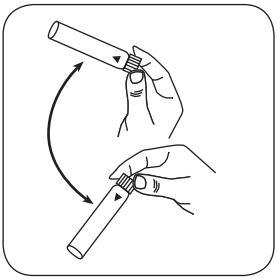
For testing of **Phosphate, total with Vario Vial Test,** carry out the described **digestion**.



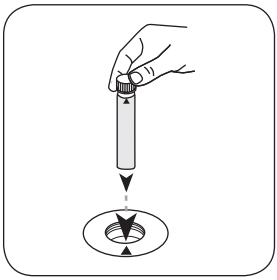
Add **2 ml 1,54 N Natrium-hydroxid-Lösung** of the digested sample.



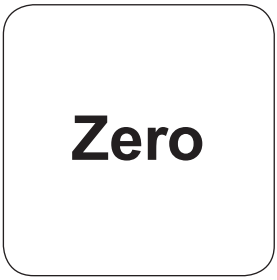
Close vial(s).



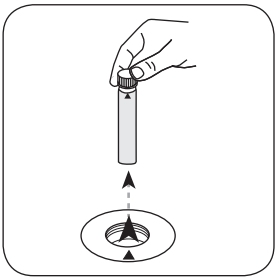
Invert several times to mix the contents.



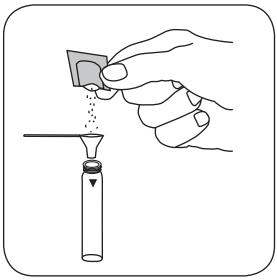
Place **sample vial** in the sample chamber. • Pay attention to the positioning.



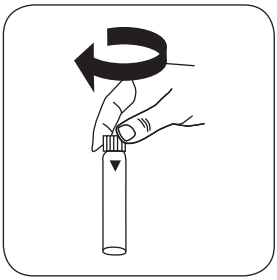
Press the **ZERO** button.



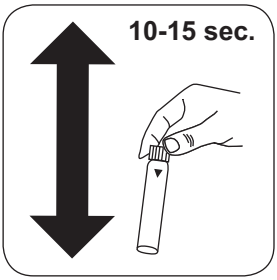
Remove **vial** from the sample chamber.



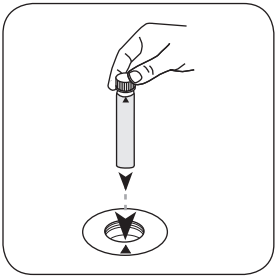
Add **Vario Phosphate Rgt. F10 powder pack**.



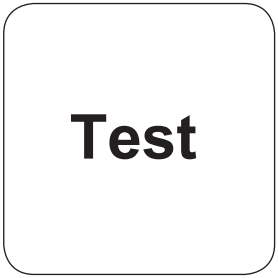
Close vial(s).



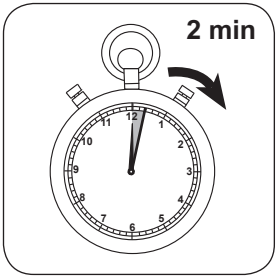
Mix the contents by shaking. (10-15 sec.).



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



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



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

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

The result in mg/l total Phosphate 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	P	1
mg/l	PO_4^{3-}	3.066177
mg/l	P_2O_5	2.29137

Chemical Method

Phosphomolybdenum Blue

Appendix

Interferences

Persistant Interferences

- Large amounts of unresolved solids can cause non-reproducible measurement results.

Interference	from / [mg/l]
Al	200
AsO_4^{3-}	in all quantities
Cr	100
Cu	10
Fe	100
Ni	300
H_2S	in all quantities
SiO_2	50
$Si(OH)_4$	10
S^{2-}	in all quantities
Zn	80

Method Validation

Limit of Detection	0.068 mg/l
Limit of Determination	0.205 mg/l
End of Measuring Range	3.5 mg/l
Sensitivity	0.11 mg/l
Confidence Range	0.06 %

Standard Deviation	0.02 µg
Variation Coefficient	1.30 %

According to

ISO 6878-1-1986,
DIN 38405 D11-4
Standard Method 4500-P E
US EPA 365.2

[a)] determination of free, combined and total | [b)] Reactor is necessary for COD (150 °C), TOC (120 °C) and total -chromium, - phosphate, -nitrogen, (100 °C) | [c)] MultiDirect: Adapter is necessary for Vacu-vials® (Order code 19 20 75) | [d)] Spectroquant® is a Merck KGaA Trademark | [e)] alternative reagent, used instead of DPD No.1/No.3 in case of turbidity in the water sample caused by high concentration of calcium and/or high conductivity | [f)] additionally required for determination of bromine, chlorine dioxide and ozone in the presence of chlorine | [g)] Reagent recovers most insoluble iron oxides without digestion | [h)] additionally required for samples with hardness values above 300 mg/l $CaCO_3$ | [i)] high range by dilution | [#] including stirring rod, 10 cm