LCS349 Phosphorus total Trace / Phosphate ortho Trace

DOC312.53.94480

Method

0.01–0.50 mg/L PO_4-P, 0.03–1.50 mg/L PO_4 or 0.02–1.20 mg/L P_2O_5 **LCS349**

Scope and application: For wastewater, drinking water, boiler water, surface water and process control.

Test preparation

pH/Temperature

The pH of the water sample must be between pH 2–10.

The temperature of the water sample and reagents must be between 15–25 °C (59–77 °F).

Lower and higher temperatures cause low-bias results.

The storage temperature of the test must be between 15–25 °C (59–77 °F).

Before starting

ATTENTION—Important information for the evaluation!

Without hydrolysis, only the (dissolved) orthophosphate is measured. The result of the orthophosphate measurement can be expressed as: mg/L PO_4-P (e.g., process analysis), mg/L PO_4 (e.g., drinking water or boiler water analysis), mg/L P_2O_5 (e.g., soil analysis).

With hydrolysis, all of the phosphorus (Total-P, P_{total}) is measured. The result of the total phosphorus measurement can be expressed as: mg/L P_{tot} = Display mg/L PO_4-P (e.g., for monitoring threshold values in wastewater), mg/L PO_4 (e.g., drinking water or boiler water analysis), mg/L P_2O_5 (e.g., soil analysis).

Analytical Quality Assurance

addista is an analytical quality assurance system to check the accuracy and precision of the analysis results at any time. Regular checks ensure that the measurement system is functioning properly and is being correctly operated, and reveal sample-specific interferences.

For trace analysis use **LCA549**: **Standard :** 0.2 mg/L PO_4-P; **Range of confidence:** 0.18–0.22 mg/L PO_4-P

Review safety information and expiration date on the package.

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

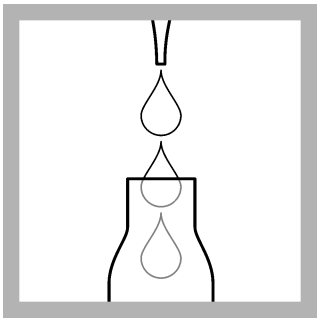
Dispose of reacted solutions according to local, state and federal regulations. Refer to the Safety Data Sheets for disposal information for unused reagents. Refer to the environmental, health and safety staff for your facility and/or local regulatory agencies for further disposal information.

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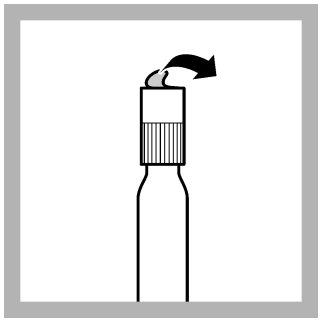
Procedure—Phosphorus total Trace—Hydrolysis



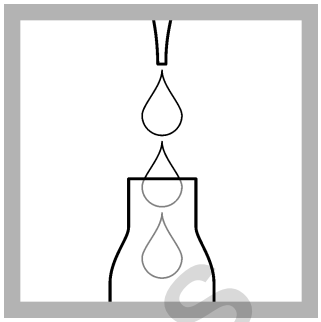
1. Sample cuvette preparation: Carefully remove the foil from the screwed-on DosiCap Zip of a cuvette.



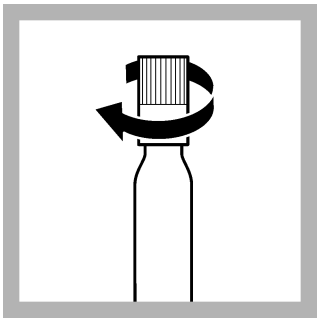
2. Pipet **3.5 mL water sample** into the **same** cuvette.



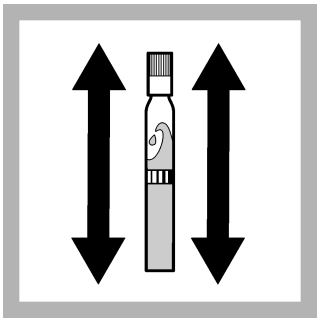
3. Blank-value cuvette preparation: Carefully remove the foil from the screwed-on DosiCap Zip of a **second** cuvette.



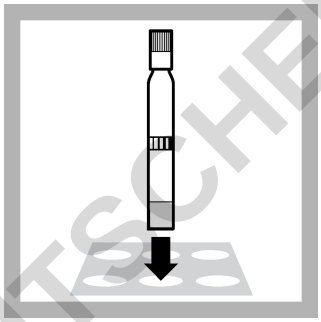
4. Pipet **3.5 mL distilled water** into the **same** cuvette.



5. Immediately screw the DosiCap Zip back on **tight** on the cuvettes; **fluting at the top**.



6. Shake the cuvettes **firmly back and forth 2 or 3 times**.

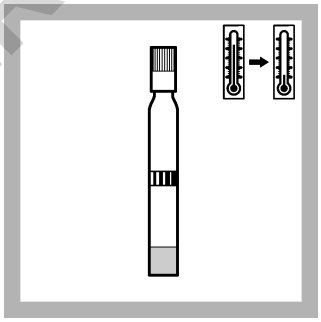


7. Heat the cuvettes in the thermostat.
HT 200 S: in the standard program HT for **15 minutes**.

Thermostat:

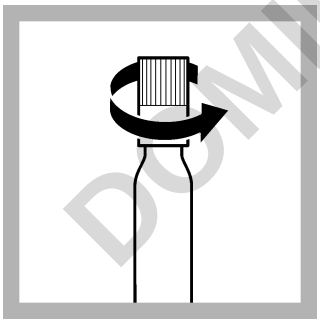
for **60 minutes** at **100° C (212° F)** or

for **30 minutes** at **120° C (248° F)**.

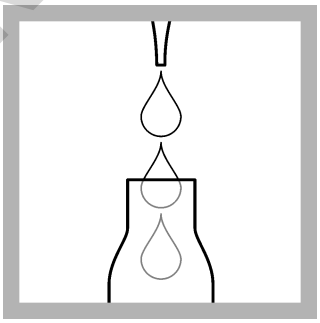


8. Allow to **cool** to room temperature.
NOTE: Check if the **cap is still tight** after cooling.

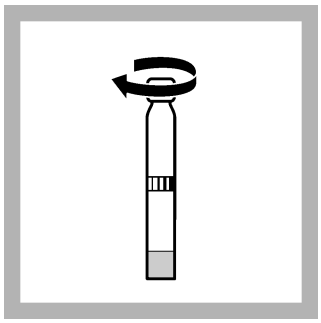
Procedure—Phosphorus total Trace—Analysis



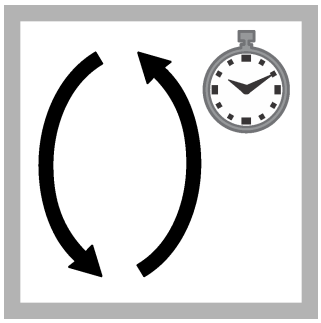
1. Unscrew the DosiCap Zip.



2. Pipet into the **cooled** cuvettes: **0.2 mL reagent B** into the **both** cuvettes. Close Reagent B **immediately** after use.

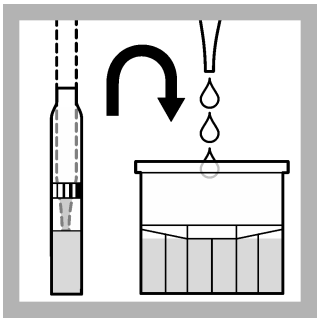


3. Screw a **grey DosiCap C** on the cuvettes.

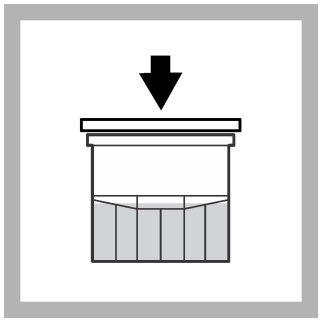


4. Invert the cuvettes a few times. After **10 minutes** invert the cuvettes a few times more.

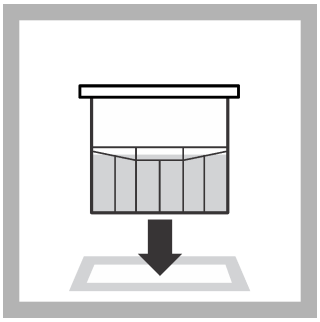
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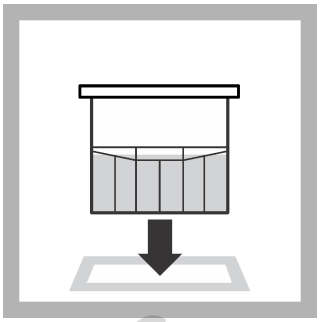
5. Open the cuvettes and transfer the contents of **each** cuvette to **50 mm semi-micro cuvettes**.



6. Close the cuvettes. Thoroughly clean the outside of the cuvettes and evaluate. **Take care that there are no air bubbles!**

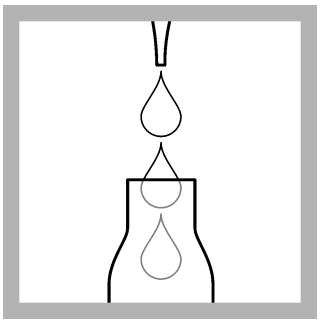


7. Insert the **blank-value cuvette** into the cell holder. Go to **Stored Programs**. select the test, push **ZERO**. Remove the blank-value cuvette.

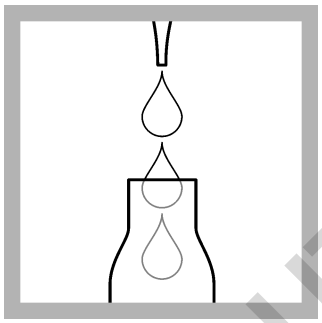


8. Insert the **sample cuvette** into the cell holder. Push **READ**.

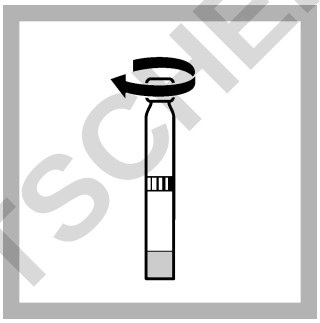
Procedure—Phosphorus ortho Trace



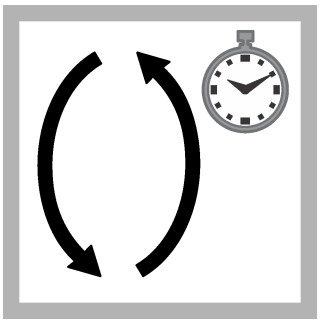
1. Sample cuvette preparation: Pipet **3.5 mL sample**. Add **0.2 mL reagent B**.



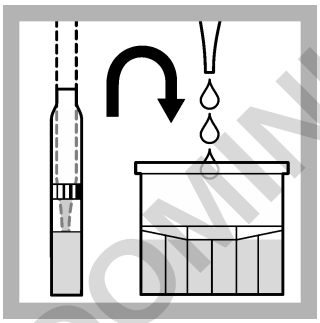
2. Blank-value cuvette preparation: Pipet **3.5 mL distilled water** into a second cuvette. Add **0.2 mL reagent B**. Close reagent B **immediately** after use.



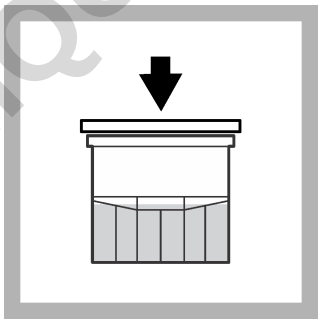
3. Screw a **grey DosiCap C** onto each cuvette.



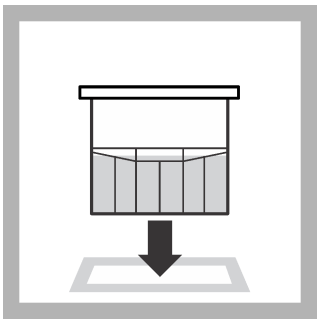
4. Invert the cuvettes a few times. After **10 minutes** invert the cuvettes a few times more.



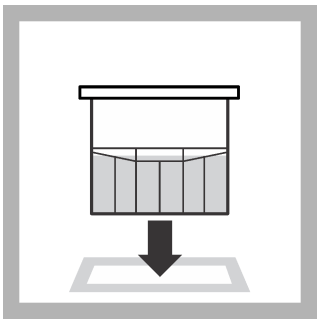
5. Open the cuvettes and transfer the content to two **50 mm** semi-micro **cuvettes**.



6. Close the cuvettes. Thoroughly clean the outside of the cuvettes and evaluate. **Take care that there are no air bubbles!**



7. Insert the **blank value cuvette** into the cell holder. Go to **Stored Programs**. Select the test. Push **ZERO**. Remove the blank-value cuvette.



8. Insert the **sample cuvette** into the cell holder. Push **READ**.

Interferences

The ions listed in the table have been individually checked against the given concentrations and do not cause interference. The cumulative effects and the influence of other ions have not been determined.

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Interference level	Interfering substance	Interference level	Interfering substance
2000 mg/L	SO_4^{2-}	20 mg/L	NO_3^-
1000 mg/L	Cl^-	10 mg/L	Sn^{2+}
500 mg/L	K^+, Na^+, Ca^{2+}	5 mg/L	CO_3^{2-}, Cu^{2+}, Fe^{3+}, Hg^{2+}, Ag^+
50 mg/L	Co^{2+}, Fe^{2+}, Zn^{2+}, Ni^{2+}, Cr^{3+}	0.5 mg/L	Cr^{6+}, Pb^{2+}

The measurement results must be subjected to plausibility checks (dilute and/or spike the sample).

Removal of interferences

If phosphonic acids are present the time for hydrolysis in the thermostat must be increased to **2 hours** at **100 °C** in order to prevent low-bias results (see procedure for the determination of total phosphorus).

Summary of method

Phosphate ions react with molybdate and antimony ions in an acidic solution to form an antimonyl phosphormolybdate complex, which is reduced by ascorbic acid to phosphormolybdenum blue.

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