LCK 348 Phosphorus total / Phosphate ortho

0.5–5.0 mg/L PO\textsubscript{4}-P, 1.5–15.0 mg/L PO\textsubscript{4} or 1.2–11.5 mg/L P\textsubscript{2}O\textsubscript{5}

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

!!! Test preparation

**Test storage**

Storage temperature: 15–25 °C (59–77 °F)

**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).

**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\textsubscript{4}-P (e.g., process analysis), mg/L PO\textsubscript{4} (e.g., drinking water or boiler water analysis), mg/L P\textsubscript{2}O\textsubscript{5} (e.g., soil analysis).

**With hydrolysis,** all of the phosphorus (Total-P, P\textsubscript{total}) is measured. The result of the total phosphorus measurement can be expressed as: mg/L P\textsubscript{tot} = Display mg/L PO\textsubscript{4}-P (e.g., for monitoring threshold values in wastewater), mg/L PO\textsubscript{4} (e.g., drinking water or boiler water analysis), mg/L P\textsubscript{2}O\textsubscript{5} (e.g., soil analysis).

Inverting the cuvette after hydrolysis improves the reliability of the result.

Determination of orthophosphate: filtrate the sample before the analysis.

In case of not working at the correct recommended temperature an incorrect result may be obtained.

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.

**Procedure total phosphorus**

1. Carefully remove the foil from the screwed-on DosiCap Zip.
2. Unscrew the DosiCap Zip.
3. Carefully pipet 0.5 mL of sample.
4. Immediately screw the DosiCap Zip back on tight; fluting at the top.
5. Shake vigorously.

   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).

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

8. Shake vigorously.


10. Pipet into the cooled cuvette: 0.2 mL Reagent B.
    Close Reagent B immediately after use.

11. Screw a grey DosiCap C on the cuvette.

12. Close the cuvette and invert a few times until the freeze-dried contents are completely dissolved.

13. After 10 minutes, invert a few more times, thoroughly clean the outside of the cuvette and evaluate.

14. Insert the cuvette into the cell holder.
    DR 1900: Go to LCK/TNTplus methods.
    Select the test, push READ.
Procedure orthophosphate

1. Carefully pipet 0.5 mL of sample.
2. Pipet 0.2 mL Reagent B. Close Reagent B immediately after use.
3. Screw a grey DosiCap C on the cuvette.
4. Close the cuvette and invert a few times until the freeze-dried contents are completely dissolved.
5. After 10 minutes, invert a few more times, thoroughly clean the outside of the cuvette and evaluate.
6. Insert the cuvette into the cell holder.

DR 1900: Go to LCK/TNTplus methods. Select the test, 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.

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 (refer to the determination of total phosphorus procedure).

<table>
<thead>
<tr>
<th>Interference level</th>
<th>Interfering substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>20000 mg/L</td>
<td>SO$_4^{2-}$</td>
</tr>
<tr>
<td>10000 mg/L</td>
<td>Cl$^-$</td>
</tr>
<tr>
<td>4000 mg/L</td>
<td>K$^+$, Na$^+$</td>
</tr>
<tr>
<td>1000 mg/L</td>
<td>Ca$^{2+}$</td>
</tr>
<tr>
<td>500 mg/L</td>
<td>NO$_3^-$</td>
</tr>
<tr>
<td>400 mg/L</td>
<td>Mg$^{2+}$</td>
</tr>
<tr>
<td>200 mg/L</td>
<td>Co$^{2+}$, Fe$^{2+}$, Fe$^{3+}$, Zn$^{2+}$, Cu$^{2+}$, Ni$^{2+}$, NO$_2^-$, Cd$^{2+}$, NH$_4^+$, Mn$^{2+}$, Al$^{3+}$, CO$_3^{2-}$</td>
</tr>
<tr>
<td>100 mg/L</td>
<td>I$^-$</td>
</tr>
<tr>
<td>Interference level</td>
<td>Interfering substance</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>50 mg/L</td>
<td>SiO₂</td>
</tr>
<tr>
<td>40 mg/L</td>
<td>Hg²⁺</td>
</tr>
<tr>
<td>20 mg/L</td>
<td>Pb²⁺</td>
</tr>
<tr>
<td>10 mg/L</td>
<td>Ag⁺, Sn⁴⁺</td>
</tr>
<tr>
<td>5 mg/L</td>
<td>Cr³⁺</td>
</tr>
<tr>
<td>1 mg/L</td>
<td>Cr⁶⁺</td>
</tr>
</tbody>
</table>

**Summary of method**

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