LCK319 Cyanide easily liberated

DOC312.53.94093

0.03–0.35 mg/L CN^- **LCK319**

Scope and application: For wastewater and process control.

Test preparation

Test storage

Storage temperature: 2–8 °C (35–46 °F)

pH/Temperature

The pH of the water sample must be between pH 7–10.

If this is not the case, the water sample must be adjusted to the correct pH:

pH < 7 Add sodium hydroxide solution drop by drop until the specified pH range is reached.

pH > 10 Add sulphuric acid drop by drop until the specified pH range is reached.

Make sure that the pH does not fall below 7, as hydrocyanic acid (HCN gas) can then escape!

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

The analysis should be carried out immediately after sampling.

Before starting

Cuvettes must be held vertically and **must not be inverted**! The sample **must not come into contact** with the membrane of the double-cap!

Reaction times

The specified digestion and cooling times must be adhered to exactly, otherwise inaccurate results may be obtained. The sample cuvette and zero solution cuvette must have the same measurement temperature of **20–23°C**.

pH

After the sample has been introduced into the digestion cuvette **the pH must be 4.0**. The pH can be checked visually. ***Compare the color of the prepared digestion cuvette with that of the reference cuvette (green) of the zero solution cuvette combination:***

Color if

pH = 4.0: Digestion cuvette **green**

pH > 4.0: Digestion cuvette **blue***

pH < 4.0: Digestion cuvette **yellow***

* ***Check the pH of the sample*** *(refer to:* pH/Temperature *on page 1)*

Thermostat

Preheat thermostat to ***100 °C*** (212 °F) (check temperature setting; higher temperatures result in dangerously high pressures). When this temperature has been reached, insert the cuvette combinations and start the reaction time (1 hour) again. ***Insert the cuvette combinations into suitably sized thermostat shafts. Do not use reducing sleeves for large shafts.***

Disposal

Do not screw the cuvette combinations apart when the analysis has been completed, but press them back into the blister packs with the indicator cuvette upwards.

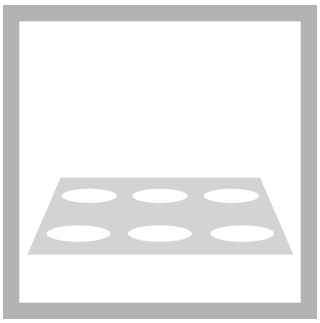
Be sure to set the required temperature to 100 °C (212 °F). At 148 °C (298 °F) the cuvette combinations may break apart.

Review safety information and expiration date on the package.

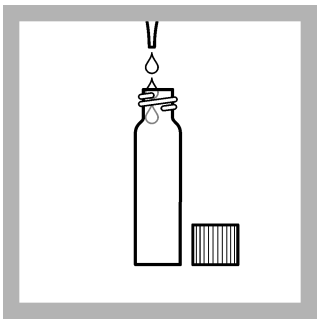
Review the Safety Data Sheets (MSDS/SDS) for the chemicals that are used. Use the recommended personal protective equipment.

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.

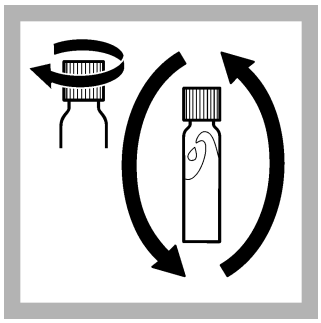
Procedure



1. Preheat the reactor to **100 °C (212 °F)**.

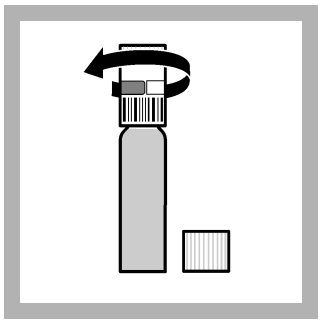


2. Sample preparation: pipet **2.0 mL sample** into the digestion cuvette.

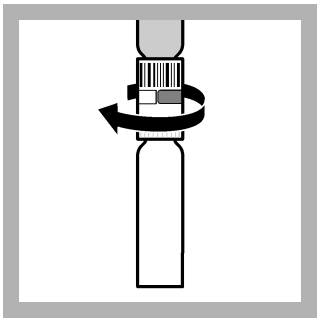


3. Close the digestion cuvette with the original cap and invert a few times.
Check the pH of the sample!
Check the pH by comparing the color of the prepared digestion cuvette with that of the reference cuvette (*green*) of the zero solution cuvette combination.

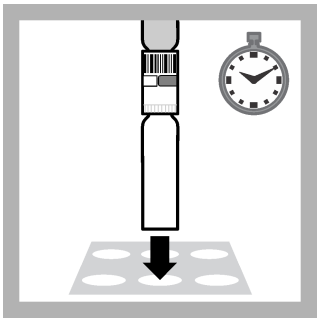
refer to: pH/Temperature on page 1



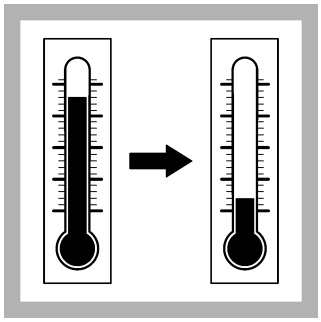
4. When the sample preparation is complete, open the **colored** indicator cuvette and close indicator cuvette very tightly with membrane double cap (screw on the membrane double-cap in such a way that the barcode label is on the lower half of the cap.



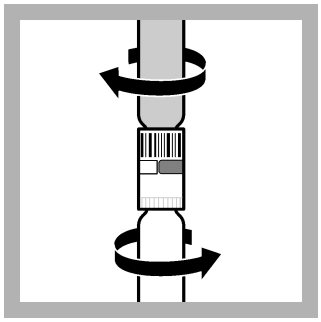
5. Open the digestion cuvette and **immediately** close the digestion cuvette **tightly** with the prepared indicator cuvette. **Hold the sample cuvette combination vertically. Do not invert!**
The sample must not come into contact with the membrane of the double-cap!



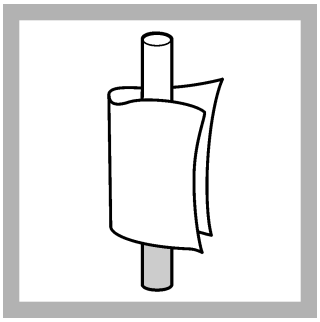
6. Heat in the reactor for **exactly 1 hour** at **100 °C (212 °F)** (**colored** indicator cuvette **upwards**).



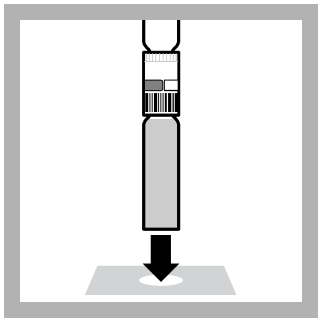
7. Allow to **cool** to room temperature for **exactly 1 hour**.



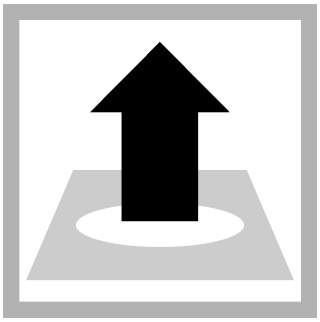
8. Tighten the **sample** cuvette combination again **before** turning it upside down.



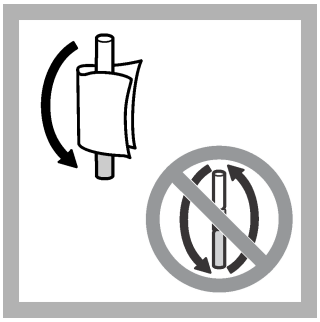
9. Thoroughly clean the outside of **zero** solution cuvette combination.



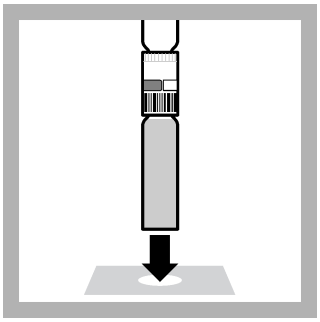
10. Insert the **zero** solution cuvette combination (blue).
DR1900: Go to LCK/TNTplus methods.
Select the test, push **ZERO**.



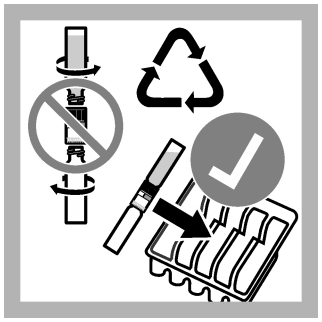
11. Remove the zero solution cuvette combination.



12. Turn the **sample** cuvette combination upside down–**do not invert!**–, thoroughly clean the outside of the indicator cuvette and evaluate.



13. Insert the **sample** cuvette combination into the cell holder (**colored** indicator cuvette **downwards**).
DR1900: push **READ**.



14. Do not screw the cuvette combinations apart when the analysis has been completed,
but press them back into the blister packs with the indicator cuvette upwards.

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.

There is no interference from:

Interference level	Interfering substance
2000 mg/L	Thiocyanate (SCN^-)
50 mg/L	Nitrite (NO_2^-), Dithionite ($S_2O_4^{2-}$)
1 mg/L	Sulphide (S^{2-}), Thiosulphate ($S_2O_3^{2-}$)

Higher concentrations of these ions cause **high-bias** results.

Interference level	Interfering substance
500 mg/L	Cyanate (OCN^-)
20 mg/L	Disulphite ($S_2O_5^{2-}$)
10 mg/L	Copper (Cu^{2+}), Sulphite (SO_3^{2-})
1 mg/L	Formaldehyde (H_2CO)

Higher concentrations of these ions cause **low-bias** results.

Wastewater samples that have been treated with dithionite, sulphite or disulphite must be pretreated with the CleanUp-Set LCW923.

As well as the CleanUp-Set LCW923, a Membrane Filtration Set is needed (LCW904 or LCW916).

Hexacyanoferrates (up to 100 mg/L) are not detected.

Oxidizing agents (for example hypochloride or hydrogen peroxide) in the sample can cause low-bias results to be obtained if the sample is left to stand or is not immediately analyzed.

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

Summary of method

The reaction converts easily liberated cyanide into gaseous HCN (hydrogen cyanide), which passes through a membrane into the indicator cuvette. The color change of the indicator is photometrically evaluated.

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