Alkalinity, Total, HR

DOC316.53.01513

Colorimetric Method **Method 10283**

200 to 700 mg/L as $CaCO_3$ **Chemkey® Reagents**

Scope and application: For boiler water.

Test preparation

Before starting

Make sure that the sample is colorless and the turbidity value is less than 20 NTU.
Use a new Chemkey for each measurement.
Do not touch the Chemkey with hands.
Do not move the Chemkey after it is installed in the meter.
The display shows a progress bar with the time that remains until the measurement is completed. Different parameters have different reaction times.
The meter automatically identifies the type of Chemkey(s) that is installed.
Refer to the meter documentation for additional information.
The Chemkeys are articles and have no MSDS/SDS.
Dispose of reacted solutions according to local, state and federal regulations. Refer to the environmental, health and safety staff for your facility and/or local regulatory agencies for further disposal information.

Items to collect

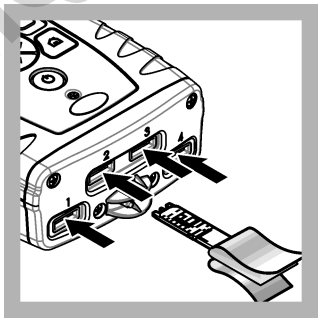
Description	Quantity
Total Alkalinity High Range Chemkey Reagents	1

Refer to Consumables and replacement items on page 3 for order information.

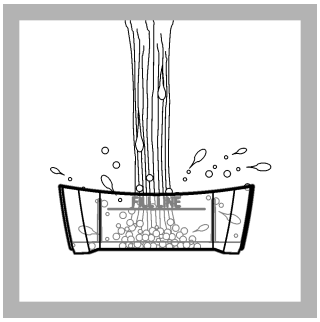
Test procedure



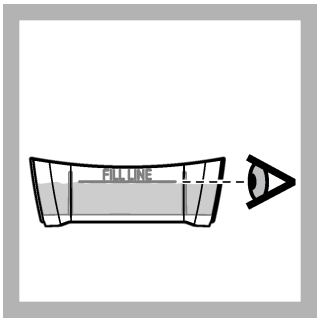
1. Peel back the packaging to show the end of the Chemkey. Do not touch the Chemkey with hands.



2. Put the Chemkey quickly in one movement into any slot. Carefully remove the packaging from the Chemkey.

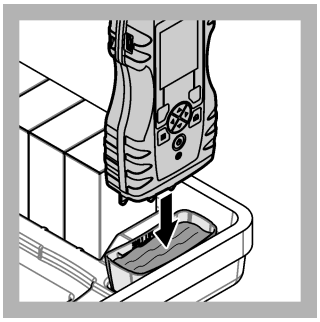


3. Rinse the sample cup with the sample.

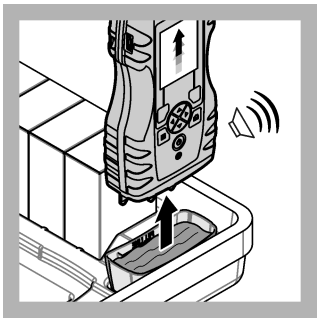


4. Fill the sample cup to the fill-line with sample.

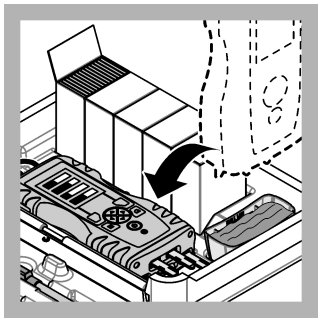
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5. Put the meter into the sample cup.



6. Wait for the sound alert and/or the meter removal animation (within 1 to 2 seconds), then immediately remove the meter from the sample cup.



7. Put the meter back into the case. Wait for the measurement to complete.

Interferences

Chlorine can interfere with the indicators. Add 2–3 drops of 0.1 N Sodium Thiosulfate to remove the interference.

The substances that are shown in Table 1 do not interfere in the total alkalinity determination at or below the given concentration.

Table 1 Non-interfering substances

Substance	Maximum level tested	Substance	Maximum level tested
Chloride (Cl^-)	1000 mg/L	Phosphate (PO_4^{3-})	50 mg/L
Copper (Cu^{2+})	5.0 mg/L	Potassium (K^+)	100 mg/L
Hardness, Ca (as $CaCO_3$)	600 mg/L	Silica (SiO_2)	50 mg/L
Hardness, Mg (as $CaCO_3$)	600 mg/L	Sodium (Na^+)	3000 mg/L
Iron (Fe^{2+})	2.0 mg/L	Sulfate (SO_4^{2-})	1000 mg/L
Manganese (Mn^{2+})	0.50 mg/L	Zinc (Zn^{2+})	2.0 mg/L
Nitrate (NO_3^-–N)	50 mg/L		

Accuracy check

Standard solution method

Use the standard solution method to validate the test procedure, the reagents and the instrument.

Items to collect:

- 25,000-mg/L as CaCO3 Alkalinity Standard Solution (Voluette Ampule)
- 200-mL volumetric flask, Class A
- Pipet, adjustable volume, 1.0–5.0 mL and pipet tip
- Deionized water

1. Prepare a 500-mg/L alkalinity standard solution as follows:
   a. Use a pipet to add 4.0 mL of the alkalinity standard solution into the volumetric flask.
   b. Dilute to the mark with deionized water. Mix well. Prepare this solution daily.
2. Use the test procedure to measure the concentration of the prepared standard solution.

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3. Compare the expected result to the actual result.

   Note: *The factory calibration can be adjusted slightly with the standard adjust option so that the instrument shows the expected value of the standard solution. The adjusted calibration is then used for all test results. This adjustment can increase the test accuracy when there are small variations in the reagents or instruments.*

Method Performance- Alkalinity

The method performance data that follows was derived from laboratory tests during ideal test conditions. Users can get different results under different test conditions.

Serial Number Range (Last 4 digits)	Standard	Precision (95% confidence interval)	Sensitivity Concentration change per 0.010 Abs change
1650 and greater	500 mg/L $CaCO_3$	470 to 530 mg/L $CaCO_3$ Calibrated	8.5 mg/L $CaCO_3$
Less than 1650	500 mg/L $CaCO_3$	425 to 575 mg/L $CaCO_3$* Not Calibrated	8.5 mg/L $CaCO_3$

*For SL1000 instruments where the last four digits of the serial number are less than 1650, the actual performance may be similar to the precision shown above for instruments with serial number 1650 or higher. To determine actual performance, follow the Accuracy Check on the preceding page. If performance is not equivalent to the instruments with the higher serial numbers, please contact your local Technical Support representative for instructions on how to have your instrument calibrated.

Summary of method

Hydroxides, carbonates and other buffers react with reagents in the chemkey to change the pH. The pH has an effect on the color of a pH indicator, which is measured photometrically. The resulting absorbance is proportional to the total alkalinity of the sample.

Consumables and replacement items

Description	Quantity/Test	Unit	Item no.
Total Alkalinity High Range Chemkey® Reagents	1	25/pkg	8636100
Sample cup	1	each	9418100

Recommended standards

Description	Unit	Item no.
Alkalinity Voluette® Ampule Standard Solution, 0.500 N (25 g/L as $CaCO_3$), 10 mL	16/pkg	1427810

Optional reagents and apparatus

Description	Unit	Item no.
Ampule Breaker, 10-mL Voluette® Ampules	each	2196800
Flask, volumetric, Class A, 200 mL	each	1457445
Pipet, adjustable volume, 1.0–5.0 mL	each	BBP065
Pipet tips, for 1.0–5.0 mL pipet	75/pkg	BBP068
Water, deionized	4 L	27256
Sodium Thiosulfate Standard Solution, 0.1 N	100 mL	32332

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