

ULTRA LOW RANGE SILICA

For Use with Hach DR 2700, DR 2800, DR 3800, DR 3900, DR 5000 and DR 6000 Spectrophotometers

Ultra Low Range Silica

Hach offers ULR methods for silica using a pour-thru cell for the same concentration range. This application note demonstrates how to eliminate the pour-thru cell and allows the operator to utilize a plastic sample cell.

NOTE: The test method is based on the 1" square plastic sample cell that is used in the colorimetric Hardness test (Method 8374). Part number 2410212.

PREPARATION OF SAMPLE CELL: Pour 1 mL of the Molybdate 3 reagent solution into the plastic sample cell and completely fill with DI water. Place the cap on it and allow to sit for 15-30 minutes. This removes any residual silica. This step doesn't have to be done for each test, only when contamination is suspected.

REAGENT BLANK: Activate the reagent blank option to account for the Molybdate 3 reagent. The value is printed on the reagent blank. Use the numeric keypad on the instrument to manually adjust the reagent blank value.

1. Rinse the plastic sample cell out 3 times with the sample to be tested.
2. Fill the sample cell to the 25 ml mark with the water sample.
3. Add 0.5 mL of the Molybdate 3 reagent. Place the cap on the cell and invert several times to mix.
NOTE: if you are using the Molybdate 3 in the 100 ml dropper bottle, the dropper is marked at 1.0 and 0.5 ml.
4. Wait 4 minutes, using the TIMER.
5. Remove the cap and add 0.5 mL of the Citric Acid Reagent. Place the cap on the cell and invert several times to mix.
NOTE: if you are using the Citric Acid in the 100 ml dropper bottle, the dropper is marked at 1.0 and 0.5 ml.
6. Wait 1 minute, using the TIMER.
7. Wipe off any fingerprints and place plastic sample cell into the spectrophotometer and press ZERO.
8. Add 0.5 mL of the Amino Acid F Reagent. Place the cap on the cell and invert several times to mix.
9. Place the sample cell back into the spectrophotometer and press READ.

Apparatus and Reagents needed for this application:

1. 1 inch square plastic cells (12/pkg), PN 2410212
2. ULR Silica Reagent Set (using Amino Acid F solution, 100 tests), PN 2553500
OR
ULR Silica Reagent Set (using Amino Acid F ampules, 40 tests), PN 2581400
OR
Amino Acid F Reagent Solution (100 mL), PN 2386442
3. Amino Acid F Reagent Solution, 1.2-mL ampules (20/pkg), PN 2386442
4. Citric Acid F Reagent Solution (500 mL), PN 2254249
5. Molybdate 3 Reagent Solution (500 mL), PN 199549

Summary of method

Modifications are necessary to adapt the Low Range Silica method for analyzing trace levels in the Ultra Low Range method. Liquid reagents produce more reproducible readings and lower blank values by eliminating slight turbidity that may remain when using powdered reagents. Use of liquid reagents in continuous monitors for silica provides a means of confirming the analyzer performance.

Silica and phosphate in the sample react with molybdate ions under acidic conditions to form yellow silicomolybdic acid complexes and phosphomolybdic acid complexes. Addition of citric acid destroys the phosphate complexes. Amino Acid F Reagent is then added to reduce the yellow silicomolybdic acid to an intense blue color, which is proportional to the silica concentration. Test results are measured at 815 nm.



Distribuidor autorizado de HACH en:

 Argentina

Tel: (+54 11) 5352 2500

Email: info@dastecsrl.com.ar

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