Film Forming Amines

DOC316.53.01551

Film Forming Amines Method

Method 10317

0.020 to 3.000 mg/L as OLDA

Reagent Solution

(0.030 to 4.000 mg/L as ODA or OLA)

Scope and application: For measuring active film forming amine (FFA) products in high pressure boiler systems (ultrapure water). Film forming amines include OLDA (N-Oleyl-1,3-propanediamine), ODA (Octadecylamine) and OLA (Oleylamine).

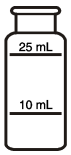
Test preparation

Instrument-specific information

Table 1 shows all of the instruments that have the program for this test. The table also shows sample cell and orientation requirements for this test.

To use the table, select an instrument, then read across to find the applicable information for this test.

Table 1 Instrument-specific information

Instrument	Sample cell orientation	Sample cell
DR6000	The fill line is toward the user.	1-inch square, 25 mL glass sample cell 
DR3900	The fill line is to the left.	

Before starting

This method is technique sensitive. Watch the training video for Film Forming Amines on www.hach.com to learn the correct techniques to use in the test procedure.
Make sure that the cell compartment of the DR6000 spectrophotometer is closed before ZERO or READ is pushed and during the reaction period. The cell compartment of the DR3900 spectrophotometer can stay open during the test.
The zeroing steps (steps 7 to 12 in the test procedure) should be done for each analysis. Complete all of the steps of the test procedure for each analysis.
The recommended temperature for samples and reagents is 15-30 °C (59-86 °F) .
Measure the volume of the sample accurately. Make sure there is no sample or liquid in the sample cell stopper when the stopper is put on the sample cell.
Measure the volume of the liquid reagent accurately. Use only calibrated pipettes. Refer to Pipetting procedure on page 3.
The sequence in which the reagents are added to the sample is important.
Review the expiration date on the package. Do not use expired reagents.
Use a different pipette for each reagent to prevent cross-contamination of the reagents. The pipette used for reagent 1 should not be used for reagent 2. The pipette used for reagent 2 should not be used for reagent 1. ***Note:*** *It is not sufficient to change the pipette tip (or to clean the pipette) between reagent additions. If the pipette is cleaned between reagent additions, it will take longer to complete the test, which will have an effect on the accuracy of the test.*
Make sure that the sample cells are clean and there are no scratches where the light passes through them.
Make sure that there are no fingerprints or liquid on the external surface of the sample cells. Wipe with a lint-free cloth that is not abrasive.
Use only parts that are free of contamination for sample collection and to do the test.

The test result shows the concentration in mg/L as OLDA by default. To show the concentration as a different film forming amine (ODA or OLA), go to Options > More and select the applicable FFA. ***Note:*** *If the active ingredient in the FFA product is not known, refer to the SDS for the FFA product or contact the supplier.*
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.

Items to collect

Description	Quantity
FFA Reagent 1	1.00 mL
FFA Reagent 2	1.00 mL
Sample cell, glass, 1-inch square, 25 mL	1
Sample cell stopper	1
Pipettes, adjustable volume, 0.1–1.0 mL	2
Pipette tips, for 0.1–1.0 mL pipet	2

Refer to Consumables and replacement items on page 6 for ordering information.

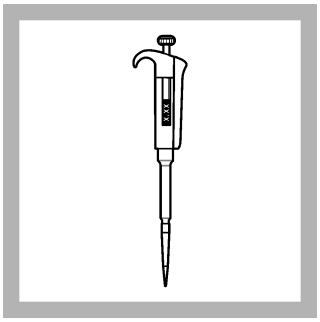
Sample collection and storage

Film forming amines (FFA) will form a layer on most surfaces, which can cause incorrect results. It is highly recommended to collect the sample directly into a clean sample cell and start the test procedure immediately. If it is not possible to collect the sample directly into a sample cell, collect the sample in a clean plastic (polyethylene or polypropylene or PTFE) bottle.

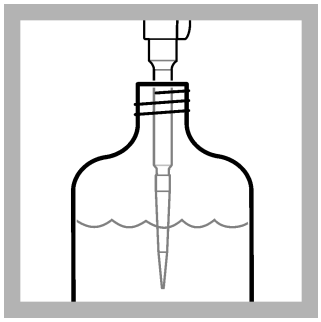
Obey the instructions that follow during sample collection for accurate results:

- Make sure that the sample temperature is 15-30 °C (59-86 °F) before analysis.
- Before the sample is collected, rinse the sample cell and stopper (if the sample cell is used for collection) or the sample bottle and cap (if a sample bottle is used for collection) 5 times with the sample.
- Discard all liquid from the sample cell and stopper before the specified sample volume is added during the test procedure.
- If a sample bottle is used for collection, invert or swirl the sample bottle before the sample is poured into the sample cell.
- If a sample bottle is used for collection, pour the sample directly from the sample bottle into the sample cell. Do not pour the sample into a second container.
- If possible, do not use equipment to transfer the sample from the sample bottle to the sample cell. If equipment must be used (e.g., graduated cylinder or plastic transfer pipette), rinse the equipment with the sample a minimum of 4 to 5 times before use.
- Analyze the samples immediately (if collected in the sample cell) or as soon as possible (if collected in a sample bottle) for best results. The samples should not be preserved for later analysis.
- Do not use a detergent that contains phosphate to clean the sample bottles. The phosphate in the detergent can contaminate the sample.

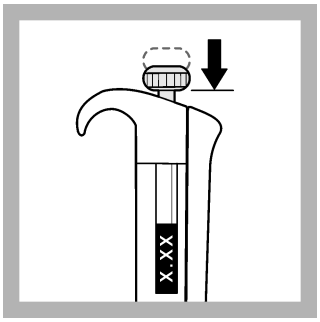
Pipetting procedure



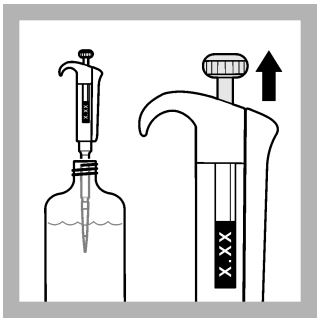
1. Hold the pipette vertically.



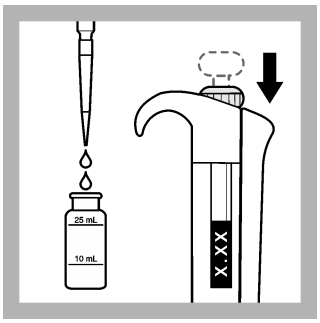
2. Put the pipette tip into the middle of the solution.



3. Push the pipette button down to only the first stop.



4. Slowly release the pipette button to pull the correct quantity of solution into the pipette tip.
Wait until the button is fully released before the pipette tip is removed from the solution.

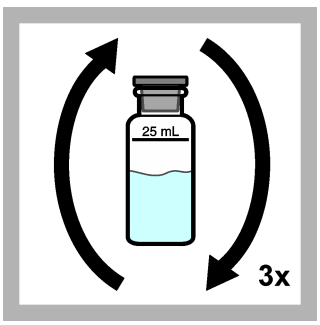


5. Push the pipette button fully down to add the solution to a sample cell.
Do not let the pipette tip touch the solution in the sample cell or the surface of the sample cell.
Do not let the liquid on the outer surface of the pipette tip go into the sample cell.

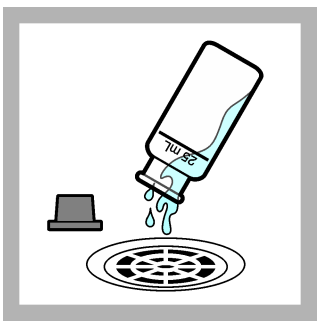
Test procedure

1. Rinse the sample cell: Rinse a clean sample cell and sample cell stopper with RO DI water (reverse osmosis, deionized water).

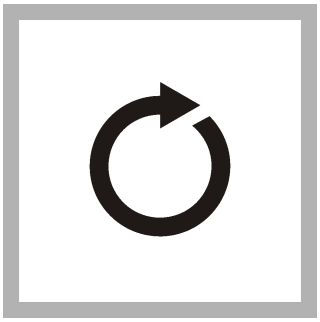
2. Partially fill the sample cell with the sample. Put the sample cell stopper on the sample cell.



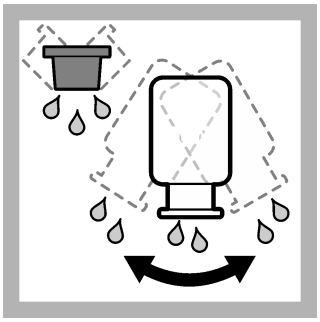
3. Invert the sample cell 3 times.



4. Discard the sample from the sample cell.

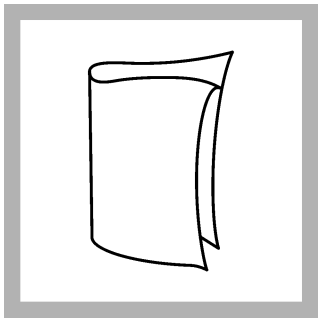


5. Repeat steps 2, 3 and 4. If the sample is collected directly into the sample cell, repeat steps 2, 3 and 4 four times.

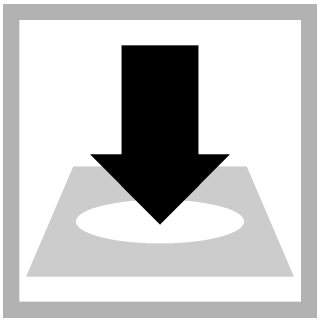


6. Shake the sample cell and sample cell stopper to remove the sample.

7. Prepare the blank: Fill the sample cell to the 25-mL line with sample. Make sure that the lower meniscus of the sample touches the fill line.

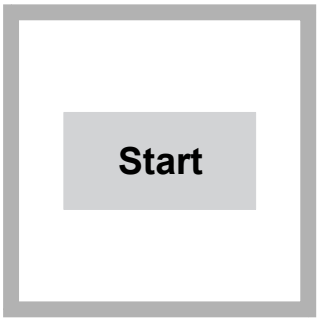


8. Clean the sample cell.

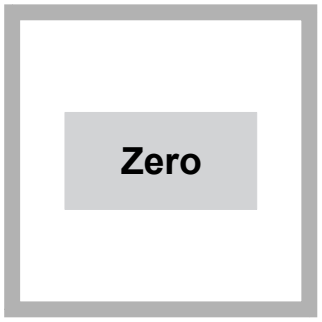


9. Insert the sample cell into the cell holder. DR6000: Close the cell compartment.

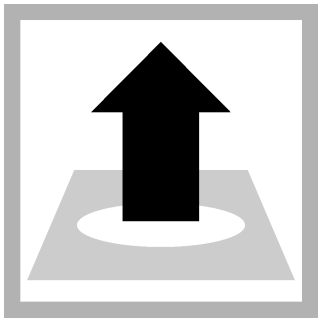
For the correct sample cell orientation, refer to Instrument-specific information on page 1.



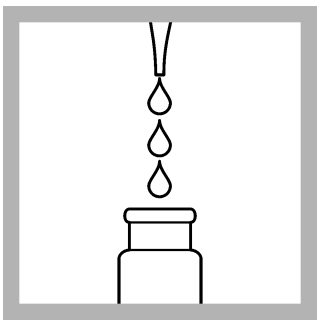
10. Start program **795 Film Forming Amines**.



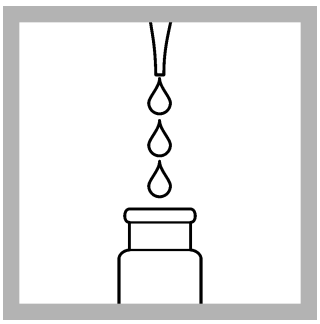
11. Push **ZERO**. The display shows 0.000 mg/L OLDA.



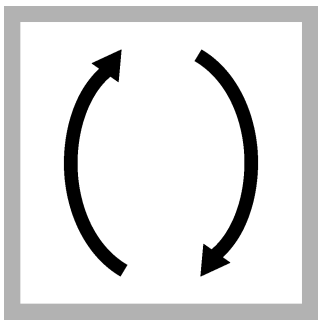
12. Remove the sample cell from the cell holder.



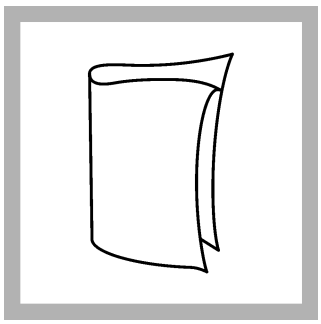
13. Prepare the sample: Use a pipette to add 1.00 mL of **FFA Reagent 1** to the sample cell.



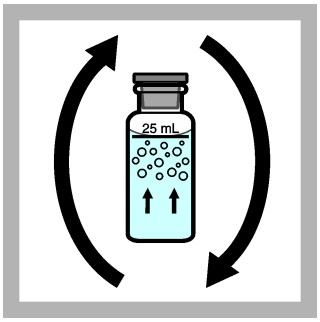
14. Use a second pipette to add 1.00 mL of **FFA Reagent 2** to the sample cell.



15. Put the sample cell stopper on the sample cell. Slowly invert the sample cell 4 times to mix. DO NOT shake.

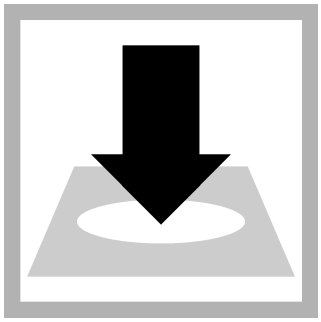


16. Clean the sample cell.



17. If necessary, gently tap or invert the sample cell to remove the bubbles in the sample cell.

Do not shake the sample cell.



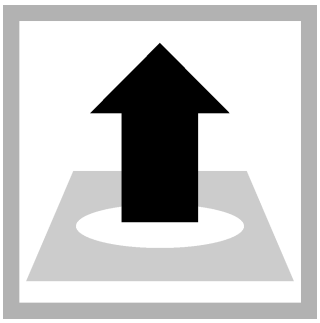
18. Insert the prepared sample into the cell holder. DR6000: Close the cell compartment.

For the correct sample cell orientation, refer to Instrument-specific information on page 1.

19. Immediately start a 2-minute timer.

20. When the timer expires, immediately push **READ**. Results show in mg/L as OLDA.

Note: *OLDA is the default FFA. To show the test result as ODA or OLA, go to Options > More and select the applicable FFA.*



21. Remove and clean the sample cell and sample cell stopper. Refer to Clean the sample cells after use on page 5.

Clean the sample cells after use

⚠WARNING

Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.

⚠CAUTION

Chemical exposure hazard. Dispose of chemicals and wastes in accordance with local, regional and national regulations.

Clean the sample cells and sample cell stoppers after each use to prevent stains.

1. Rinse the sample cell and the sample cell stopper a minimum of 3 times with deionized water.
2. Fill the sample cell ¼-full with isopropyl alcohol.
3. Put the sample cell stopper on the sample cell.
4. Shake the sample cell vigorously. Discard the solution.

5. Fully rinse the sample cell and sample cell stopper with deionized water a minimum of 4 times.
6. Prevent contamination of the sample cells and sample cell stoppers until later use.

Method performance

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

Refer to the FFA Test Guidelines (DOC316.53.01558) available on www.hach.com to better understand the nature of the analyte and how to assess the test results. Contact technical support for more help with the method.

Program	Standard	Precision (95% confidence interval)	Sensitivity Concentration change per 0.010 Abs change
795	0.5 mg/L OLDA	0.490–0.510 mg/L	0.030 mg/L

Summary of method

In acidic medium, the dye forms a pink colored complex with the film forming amine. The intensity of color is proportional to the concentration of the film forming amine. The measurement wavelength is 560 nm.

Consumables and replacement items

Note: *Product and Article numbers may vary for some selling regions. Contact the appropriate distributor or refer to the company website for contact information.*

Required reagents

Description	Unit	Item no.
Film Forming Amines Test Kit, includes:	each	3630000
FFA Reagent 1	100 mL	3610042
FFA Reagent 2	100 mL	3620042

Recommended standards and apparatus

Description	Unit	Item no.
Sample cell, glass, 1-inch square, 25 mL	2/pkg	1353702
Stoppers for 18-mm tube	25/pkg	173125
Pipette, adjustable volume, 0.1–1.0 mL	each	BBP078
Pipette tips, for 0.1–1.0 mL pipette	100/pkg	BBP079

Optional reagents and apparatus

Description	Unit	Item no.
Sampling bottle with cap, low density polyethylene, 500 mL	12/pkg	2087079
Water, deionized	4 L	27256
Isopropyl alcohol	500 mL	1445949
Isopropyl alcohol	4 L	1445917

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03/2023, Edition 1