Film Forming Amines Test Guidelines

Film forming amines in process water

Film forming amines (FFA) in process water will adhere to almost any type of surface. Any surface that FFA touch can develop a layer of FFA. Surfaces include (but are not limited to):

- Parts of the steam cycle that come in contact with FFA
- Sample lines through which process water flows before collection
- The container or sample cell that is used to collect the sample
- Other labware (if applicable) that comes in contact with FFA during a test

How strong or weak the FFA adheres to a surface depends on the type of surface. The tendency and rate at which the layer forms also depends on the concentration of FFA in the water. Different FFA samples with different FFA concentrations can result in a different extent of the surface coating of the FFA.

The adsorption and desorption of FFA from a nonmetallic surface is an equilibrium process, where the FFA adheres to and also comes off of the surface. The equilibrium can easily be disturbed due to factors such as a change in the concentration of FFA in the water, a change in temperature and if the sample is shaken. When the equilibrium is disturbed, the FFA test results can increase or decrease.

The concentration of FFA in water can change over time due to all of the conditions given above.

Accuracy expectation of the film forming amines test

Because the concentration of FFA in water can change by a few ppb at any time and the Rose Bengal chemistry is technique sensitive, an accuracy specification better (or tighter) than ±10 ppb does not seem analytically reasonable. With these considerations, the limit of detection (LOD) for method 10317 is set to 20 ppb.

If all of the instructions in the test method are followed correctly and the sample does not have contamination, an LOD of 10 (±10) ppb is possible. Although an LOD of 20 ppb is typical of what most users can measure, a test result of 10 ppb to less than 20 ppb might not be discarded.

Comparison with other methods

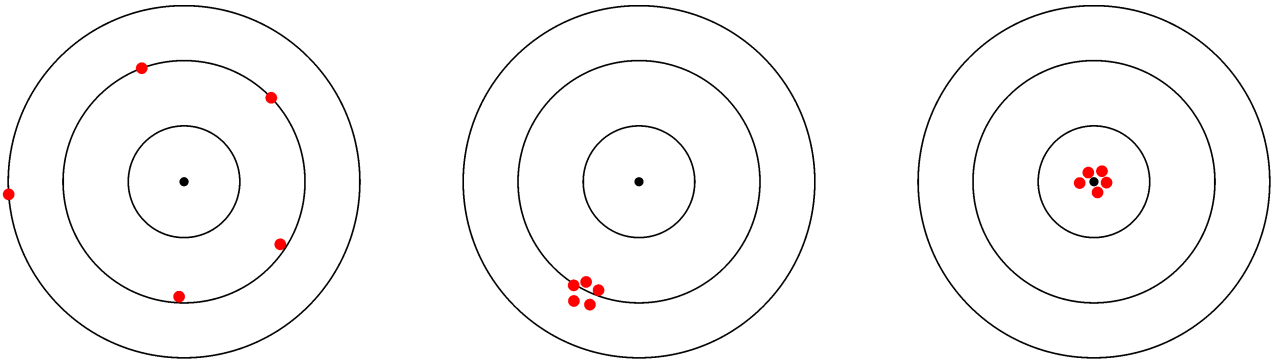
If samples are collected from the same part of the steam cycle but from different sample lines or in different sample containers, the test result from each channel or container can be different. To compare the test results from method 10317 with a different test method, make sure to collect and use sample water from the same sample bottle and start the test procedures as near to the same time as possible. For method 10317, follow all of the instructions in the FFA test procedure and watch the training video on www.hach.com.

Precision of the FFA test

Accuracy defines how near a test result is to the true value. Precision defines how near repeated measurements are to each other. Although precise results suggest accuracy, they can be inaccurate. Figure 1 gives examples of accuracy and precision. The black dot at the center of each circle is the accurate value and the red dots are the test results from a method.

For a method to be accurate, the method must be precise. Hach method 10317 for film forming amines has been developed to be very precise and as accurate as possible.

Figure 1 Accuracy and precision examples



Example 1: values are not accurate and not precise.

Example 2: values are not accurate; but are precise.

Example 3: values are accurate and precise.

Interpretation of results

Different facilities will use different strategies for corrosion control. Hach cannot determine if the measured FFA concentration is sufficient for the applicable system. Refer to the manufacturer of the film forming amine product to determine if the concentration of FFA in the process water should change.

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