

Technical Note

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Force Tensiometer – K12

Avoiding contamination when performing automated critical micelle concentration experiments

A guideline for obtaining proper results

New users of the Force Tensiometer K12 for CMC measurement sometimes have difficulties obtaining good reproducible data from their unit. We have found that a number of these problems can be traced to poor sample preparation and dosing device clean up.

The quality of CMC measurements can be highly influenced by contamination. Therefore, you must make sure that everything which comes into contact with your samples is free of contamination during preparation!

Before you make up your dosing solution, clean the container in which you will make it with copious amounts of hot, distilled water. Strong acid or base treatment is also not a bad idea, but for most applications, hot distilled water will suffice. Clean the K12 sample dish and stir bar likewise. After cleaning, and before the experiment, cover them so as not to expose them to dust or other contaminants in the atmosphere. If possible, isolate the instrument working area from solvent vapors. If you can smell organic solvents in your lab, then small amounts of these solvents are undoubtedly adsorbing on the surface of your sample during the experiment. Doors on the K12 help reduce this effect, but do not eliminate it. Use water that is free from organic contaminants in sample preparation, and use the same water consistently.

Clean the platinum plate or ring with distilled water before you flame it. Flaming of the plate or ring is critical. Be sure that the plate is red hot for at least 3 seconds before you remove it from the flame. Don't go overboard on this, however. If you burn your hand by holding the opposite end of the shaft, you have gone to the extreme. Flame the plate or ring immediately before use. This is critical, because platinum is a high energy surface. Quite literally, anything in the air will begin to coat its surface quickly after flaming.

One of the things that few people consider in the way of contamination is the Dosimat. What was last in the Dosimat? We recommend that prior to each experiment you clean the Dosimat by the following steps:

1. Use the keypad control to pump all liquid out of the Dosimat and attached lines. This will leave about 1 ml of liquid from the last experiment in the glass syringe portion of the Dosimat.
2. Press "FILL" on the Dosimat to bring that liquid to the bottom of the syringe. Next, pump 1.25 ml more by entering this amount on the keypad. This should leave the piston near the center of the syringe. Disconnect the feed line to the top of the syringe, unscrew the fasteners at the bottom of the syringe, and remove the syringe. The piston will disconnect from the Dosimat drive screw allowing you to do this. Take the piston out of the syringe using the piston extractor if needed. Wash the piston and syringe with hot distilled water. Reattach the piston, syringe, and all of the lines to the Dosimat.
3. Pump at least 100 ml of hot distilled water through the Dosimat to clean the lines from the last use and repeat steps 1 and 2.
4. After the Dosimat is reassembled (and hopefully clean), pump at least 40 ml of the dosing solution for your study through the lines before setting up the experiment.

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