Contact Angle Measurements on Glass

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1. In the normal profile mode, where we look sideways at the sessile drop, the FTA200 software should work automatically down to 10° without normal care and down to 5° with special care. Around 5 degrees, one gets "glare" across the top of the drop which confuses automatic analysis. The drop no longer appears as a silhouette against the backlight.

2. Manual analysis, where the user clicks on the drop profile to locate it and the baseline, allows analysis down to, say, 3°.

3. If the specimen is large, you must have the camera "look down" on it slightly. This look-down angle is often 3°. This angle itself places a lower limit on the contact angle which can be resolved. Basically, a wet spot of zero contact angle appears to have the "height" of a 3° (or whatever) angle drop. Small specimens (less than an inch or two across) can be looked at exactly horizontally and this particular limitation is then removed. You can go to lower contact angles in the horizontal camera mode also because the glare issue is not as bad.

4. While contact angle accuracy requirements near zero degrees are not stringent for surface energy analysis, you *do* need low angle measurements if you want to measure spreading. This occurs when the surface energy of the glass is higher than the surface tension of the test fluid. If you want to do this, we can offer a variation where the camera looks down at a high angle and the glass it lit from underneath. Then what you measure is the diameter of the spreading drop. This will accommodate zero contact angle surfaces, because you can see the spreading edge and measure it. This is an alternative, or complement, to traditional sessile drop contact angle measurements by drop profile.

5. As a further alternative, you can use salt water as a test fluid in place of water. Raising the test fluid surface tension makes a big difference, as the following table shows for three example surfaces. The Girifalco model was used for estimating these. The other more sophisticated models give the same/similar answers at these low angles.

Surface Energy	C.A. with Fluid γ = 72.8 (H_20)	C.A. with γ = 76.0 (HCL in H_2O)
72.8	0°	16.7°
72.5	5°	17.4°
71.7	10°	19.6°

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