

## ***Aqueous Dispersion Procedure for Nanospense AQ Lab Scale***

***Last Review date: July 30, 2010***

Nanospense AQ is surfactant designed for the production of stable aqueous suspensions of multi-walled carbon nanotubes (MWCNTs). The composition is a tailored blend of proprietary nonionic/anionic dispersants.

The quality of a suspension can be measured by the sedimentation time and the sediment height. Without the addition of Nanospense AQ, aqueous suspensions of MWCNTs are not stable, and will form agglomerates that settle quickly, leaving a loosely packed sediment. However, with Nanospense AQ, nanotube suspensions are stable for weeks or longer and settle only slowly.

The following is our recommended dispersion procedure for lab scale suspensions at 1g/liter concentration

1. Place 100 ml of deionized water in a 200 ml beaker.
2. Add 4 drops or ~0.1 g of Nanospense AQ to the DI water.
3. Stir until the Nanospense AQ has dissolved completely.
4. Add 0.1 g of powdered MWCNTs and stir until the powder is wetted out.
5. For best results, use an ultrasonic probe to disperse the nanotubes. For Misonix probe sonicators, processing for 3-5 minutes at 30-40% using the 1/2" diameter tip is typically sufficient. Note: NanoLab is a distributor of Misonix probe sonicators. Ultrasonic baths are less effective in preparing nanotube suspensions, and the process may take hours to complete if a bath is used.
6. After sonication, the suspension is ready for use. Brief sonication may be necessary if the suspension is allowed to sit for a week or more.

Foam may be generated if the suspension is shaken; this is due to the addition of the Nanospense AQ and is a normal sign of surfactant use. If a foam free dispersion is required, call NanoLab for an anti-foam agent. In addition, the color of water will blacken indicating that a stable suspension is being produced.

If using larger amounts of nanotubes, please be sure to increase the Nanospense AQ level proportionally.

We hope these instructions are helpful, please call us if you have any further questions at (781) 609 2722. We are most happy to serve.

Best regards,

NanoLab Technical Service