TechNote 203A

Drying & Re-Suspending Microspheres

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B E A D S ● A B O V E T H E R E S T ™

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I. INTRODUCTION

Most of our polymer microspheres are supplied as 1-10% aqueous suspensions. If you require dry polymer beads, we are able to dry 1µm+ spheres on a custom basis. Likewise, you may opt to dry aqueous suspensions of polymer beads at your facility using the drying procedure in the next section. We do not typically dry submicron polymer beads in-house as they are more likely to aggregate irreversibly upon drying due to the large hydrophobic surface area presented by such small spheres per unit mass or volume of beads.

We offer dry and wet forms of most of our silica microsphere products (including submicron diameters). Generic protocols for drying and re-suspending silica or polymer beads may be found in the following section.

II. GENERAL PROTOCOL

A. Drying Microspheres

To dry, we suggest taking polymer or silica microspheres through a gradual phase change until they are suspended in alcohol (methanol or ethanol), followed by evaporation of the solvent. The phase change allows the removal of water that might otherwise become trapped, which would make aggregation more likely upon drying. A general protocol follows:

1. Use centrifugation to concentrate the beads.
2. Draw off the supernatant and resuspend in 25% alcohol / 75% water.
3. Repeat, with 50%, 75%, and 100% alcohol solutions, respectively.
4. Allow alcohol to evaporate (in an oven [70˚C] or at room temperature), leaving dry microspheres.
5. Microsphere cake may be crushed with a mortar and pestle and then dried again. Final crushing may be performed to form a dry powder.

B. Re-Suspending Microspheres

Dry *polymer microspheres* may be re-suspended in aqueous buffers using a combination of physical mixing methods (e.g. rolling / rotation, hand-shaking, vortexing, sonication, etc.) and surfactant addition (e.g. 0.005 - 0.1% Tween® 20, Triton™ X-100, SDS, etc.). Dilute solutions are easier to work with, so use the lowest bead concentration possible during re-suspension (e.g. ≤1% solids).

Begin by rolling or rotating the beads in a surfactant-containing solution or buffer for a few hours or overnight. Beads may then be sonicated using 1-2 minute bath sonication cycles (with ice in the bath to ensure that the beads do not overheat) or 5-10 second probe sonication cycles. Continue with alternating cycles of vortexing and sonication until the beads are sufficiently monodisperse. Beads may then be visualized under a light microscope (400X magnification) or run on an automated sizing instrument to ensure that aggregates have been dispersed.

Dry *silica microspheres* may be re-suspended in aqueous buffers / solutions or organic solvents (e.g. ethanol, methanol, THF, acetone, etc.) using the aforementioned methods. Silica, however, has a very hydrophilic surface; thus, surfactant may not be necessary to achieve colloidal stability of the suspension in aqueous buffers / solutions. Silica may be difficult to resuspend in certain solvents. Silica is also more resistant to the effects of heat, so silica beads may be sonicated for longer intervals (e.g. 5-10 minute cycles as needed) without ice in the bath.

III. RELATED LITERATURE

1. TechNote 203 - *Washing Microspheres*
2. TechNote 101 - *Polymer Microspheres*
3. TechNote 104 - *Silica Microspheres*
4. Product Data Sheet 702 - *Silica Microspheres*