

## Working with Microspheres

### MICROSPHERE HANDLING TIPS

Listed below are helpful tips when using Duke Scientific microspheres. These are general guidelines and should be used accordingly. Please read the literature that accompanies your Duke Scientific product for special handling notes (if any). If you have a critical application or are looking for a product that can be used without additional processing, please contact our technical service department.

*Note: For most applications, it is imperative to ensure the cleanliness of diluents, sampling implements, and any other component that will make contact with the microspheres.*

### RESUSPENSION

Polymer microspheres  $\geq 0.5 \mu\text{m}$  in suspension will sediment out over time. To resuspend the particles, simply invert the bottle several times avoiding rigorous agitation as bubbles formed may result in statistical artifacts. Sonication after resuspension is recommended to de-gas and break up temporary agglomerates. For applications that require the microspheres to be suspended for an extended period of time, a clean magnetic stir bar may be used.

### DILUTION

Most particle suspensions are suitable for dilution and do not require additional surfactant/dispersant, however, the diluted suspensions should be used immediately as the stability may be affected.

1. Calculate the quantity of microspheres needed based on desired final concentration and quantity.
2. Resuspend the original microsphere suspension.
3. Sample immediately into clean container.
4. Add filtered deionized water to desired amount.

### SUSPENDING DRY PARTICLES

This procedure outlines the steps necessary to put a dry powder into suspension.

1. Wet the dry particles with a 1% surfactant solution (anionic or non-ionic, i.e., Tween 20 or Triton X100) or an alcohol such as methanol or ethanol.
2. Add filtered water to the desired amount.

## DRYING A SUSPENSION

Drying a suspension to achieve a dry powder is not recommended. The microspheres may form permanent aggregates and may be aerosolized creating an inhalation hazard.

## DISSOLVING POLYSTYRENE MICROSPHERES

In general, aromatic hydrocarbons will dissolve polystyrene. Some commonly used solvents for this application are:

- Benzene
- Methyl Ethyl Ketone (MEK)
- Toluene

\*MEK and toluene will dissolve polystyrene divinylbenzene (PSDVB) over time.

## REMOVING/REDUCING ADDITIVES by ION EXCHANGE or DIALYSIS

These procedures are used to achieve low or surfactant-free suspensions for applications such as aerosol and biotechnology applications. However, removing the surfactant from a suspension may compromise the stability of the product and should be performed immediately prior to use. Please contact Duke Scientific if you are looking for a low or surfactant-free product.

### ION EXCHANGE

This procedure is recommended for removing ionic surfactants from the suspension and surface of the microspheres.

1. Obtain mixed bed ion-exchange resin (i.e., Bio-Rad AG501-X8).
2. For a 15 mL bottle of particles at 1% solids use 3 to 4 grams of resin.
3. Wash the resin thoroughly to remove potential contaminants.
  - a. Wash resin with approximately 200 mL deionized water five times.
  - b. Allow the resin to settle, and pour off the water.
4. Add the particle suspension to the resin in a small bottle. Add extra water if needed.
5. Roll the mixture for 4 to 6 hours and filter through washed glass wool to remove the resin. (Alternatively, let the resin settle and pour off the suspension into another clean bottle.)

### DIALYSIS

This procedure is recommended for removing surfactants from the suspension (but not from the microsphere surface.)

1. Wash the dialysis tubing (i.e., Spectrapor 12,000-14,000 molecular weight cut-off) thoroughly with deionized water and place it in a container of deionized water, submerged.
2. Keep refrigerated for storage.
3. When ready to use, cut off the desired length of tubing.
4. Place a clamp on one end or tie it off.
5. Fill about half full with the microsphere suspension.
6. Clamp or tie the top end and place in the container of deionized water with at least 10 to 20 times the volume of the latex.
7. Roll or stir the contents of the container.
8. Allow to dialyze for at least 4 hours.
9. Repeat dialysis three times with fresh water.