

Dispersing Microspheres In Air

Dispersing particles in air is necessary for a number of applications such as clean room testing, silicon wafer impurity testing and airborne particle counter calibration. Most often, these applications require NIST traceable microspheres at sizes below 3 microns. Due to adhesive forces on the particles, it is virtually impossible to provide dry powders of uniform particles below one micron without getting “clumps” or aggregated particles. For that reason, all of our NIST traceable polystyrene products in this size range are provided in an aqueous media.

The upper particle diameter limit for aerosolization of aqueous suspensions is approximately three microns. Particles larger than this will not disperse in air partially due to gravity, but also because they are too large for the aerosol generators currently available.

In order to use aqueous suspensions for airborne applications, it is necessary to use an aerosol generator, atomizer, or nebulizer. All of these devices generate a very fine mist from a liquid. When the liquid is a dilute suspension of particles, the ultra-fine liquid droplets will contain individual polystyrene particles. The liquid evaporates in the air, and what remains is a dry dispersion of particles in air. Dry powder dispersers are also available for larger particles.

Since water evaporates slowly, it is often desirable to use a more volatile liquid. Water/alcohol mixtures work well. They evaporate quickly and do not cause the particles to flocculate. Pure alcohol, although it dries faster, can cause flocculation of the suspension, and is not recommended. The evaporation process is accomplished with dilution air or with a desiccant dryer attached to the nebulizer.

Following is a partial list of manufacturers of different types of nebulizers and/or aerosolization equipment:

TSI Inc.	www.tsi.com
MSP Corporation	www.msppcorp.com
Devilbiss	www.devilbiss.com
Topas GmbH	www.topas-gmbh.de
Grimm Technologies	www.dustmonitor.com
Misonix Inc.	www.misonix.com