

The Effect of Index of Refraction on Low Angle Laser Light Scattering

P. A. Corber^{*}, M. Player
National Research Council of Canada, Ottawa, Canada
Andrew.Corber@nrc.ca and Michael.Player@nrc.ca

Abstract

In many practical circumstances the refractive index (RI) of the particles and/or dispersant that are under investigation are unknown. This poses a problem to the experimenter as these values are often necessary software inputs for the diagnostic tool in use. The purpose of this study is to determine the additional uncertainties that occur from entering an incorrect RI into the operating parameters of a commercial laser diffraction instrument. The experiment consists of attempting to measure particles of known size and optical properties with a Malvern Spraytec using incorrect values for RI in the operating software. The particles used were glass microspheres ranging in size from 10 μm to 200 μm . This calibration media has real and imaginary RI's of 1.33 and 0.00 respectively. Erroneous RI values for both the particle and dispersant were varied from 1.00 to 2.00. The results indicate that an incorrect RI has little effect on the measured particle size, provided that the RI of the particle and dispersant are sufficiently different. The acceptable difference was observed to decrease with particle size. Significant uncertainties were observed for a 10 μm particle if the RI of the particle and dispersant were within ± 0.08 , while for particles greater than 140 μm a difference of only ± 0.01 is sufficient for a measurement within the uncertainty limits of the calibration materials.

^{*} Corresponding author: Andrew.Corber@nrc.ca