



Designation: B 821 – 92 (Reapproved 1997)

AMERICAN SOCIETY FOR TESTING AND MATERIALS
100 Barr Harbor Dr., West Conshohocken, PA 19428
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Standard Guide for Liquid Dispersion of Metal Powders and Related Compounds for Particle Size Analysis¹

This standard is issued under the fixed designation B 821; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide covers the dispersion in liquids of metal powders and related compounds for subsequent use in particle size analysis instruments. This guide describes a general procedure for achieving and determining dispersion; it also lists procedures that are currently in general use for certain materials.

1.2 This guide is limited to metal powders and related metal compounds. However, the general procedure described herein may be used, with caution as to its significance, for other particulate materials, such as ceramics, pigments, minerals, etc.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

B 243 Terminology of Powder Metallurgy²

B 430 Test Method for Particle Size Distribution of Refractory Metal Powders and Related Compounds by Turbidimetry²

B 761 Test Method for Particle Size Distribution of Refractory Metals and Their Compounds by X-Ray Monitoring of Gravity Sedimentation²

B 822 Test Method for Particle Size Distribution of Metal Powders and Related Compounds by Light Scattering²

3. Terminology

3.1 *Definitions*—Definitions of powder metallurgy terms can be found in Terminology B 243.

4. Significance and Use

4.1 The method of powder dispersion in a liquid has a

significant effect on the results of a particle size distribution analysis. The analysis will show a too-coarse, unstable, or nonrepeatable distribution if the powder has not been dispersed adequately. It is therefore important that parties wishing to compare their analyses use the same dispersion technique.

4.2 This guide provides established powder dispersion techniques for certain materials and the means of deriving techniques for materials not listed. It shall be used by all parties performing liquid-dispersed particle size analysis of all of the materials covered by this guide (see 1.1, 1.2, and 4.1).

4.3 This guide shall be used in the preparation of powders for use in Test Methods B 430, B 761, and B 822 and other procedures that analyze metal powder particle size distributions in liquid-dispersed systems.

5. Apparatus

5.1 *Microscope*, suitable for observation of particles in the size range of 5 to 1000 μm .

5.2 *Ultrasonic Probe*, $\frac{1}{2}$ -in. (25.4-mm) tip, with the power level to be determined by this guide.

5.3 *Ultrasonic Bath*—Power level to be determined by this guide.

6. Reagents

6.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society.³ Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

6.2 *Surfactants*—Suggested surfactants are listed in Table 1 and footnotes 4 through 6.^{4,5,6}

³ *Reagent Chemicals, American Chemical Society Specifications*, American Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see *Analar Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopoeia and National Formulary*, U.S. Pharmacopoeial Convention, Inc. (USPC), Rockville, MD.

⁴ Allen, T., *Particle Size Measurement*, 4th Edition, Chapman and Hall, London, UK, 1991.

⁵ Nelson, R. D., *Dispersing Powders in Liquids*, Elsevier, New York, NY, 1988.

⁶ *SediGraph 5000ET Instruction Manual*, Micromeritics Corporation, Norcross, GA, 1984, pp. A-28 to A-31.

¹ This guide is under the jurisdiction of ASTM Committee B-9 on Metal Powders and Metal Powder Products and is the direct responsibility of Subcommittee B09.02 on Base Metal Powders.

Current edition approved Jan. 15, 1992. Published May 1992.

² *Annual Book of ASTM Standards*, Vol 02.05.