



Ebatco Nano

A Bimonthly Newsletter

Nano

Brief

A “Lunch and Learn” seminar was recently held at Niron Magnetics in Minneapolis, MN on February 11, 2026. Ebatco’s President, Dr. Dehua Yang and Technical Sales Engineer, Dr. Michael Hemenway gave a presentation titled “Particulate and Surface Analysis, Characterization and Testing”. If you would like to learn any analytical technique that Ebatco offers, please let us know about it by contacting Michael Hemenway at mhemenway@ebatco.com. We will be pleased to deliver the seminar with lunch at your place or online with lunch delivered to you.

Dr. Yang, Ms. Ming Li and Dr. Hemenway, exhibited with an Ebatco booth at MD&M West in Anaheim, CA, February 3-5. They have met many current and potential customers and learned more about new and cutting-edge medical device manufacturing technologies from industry leading suppliers and how Ebatco may assist them and their clients through our ISO/IEC 17025:2017 accredited contract lab services.

To keep pace with market needs, and to meet and greet our existing and potential customers in 2026, Ebatco will participate in several additional regional and national conferences and exhibitions as listed below:

- March 7-11 – Pittcon Conference and Exposition, Booth #3138, Henry B. González Convention Center in San Antonio, TX
- March 13 – ASM International MN Chapter Symposium: Materials Characterization of Coatings, Substrates, and Surfaces, Hennepin Technical College, Brooklyn Park, MN

- April 14-16 – PAPID + TCT, Booth 1845, Thomas Michael Menino Convention & Exhibition Center, Boston, MA
- April 28-29 – SVC TechCon, Booth 226, Long Beach Convention Center, Long Beach, CA
- May 1 – MMS Annual Spring Symposium & Poster Session, Theme: Microscopy & Nature, Minnesota Landscape Arboretum, Chaska, MN
- June 2-4 – Space Tech Expo USA, Booth 238, Anaheim Convention Center, Anaheim, CA
- September 28-October 1 – IMAT, Québec City Convention Centre, Quebec City, Canada
- October 28-29 – MD&M Midwest, Booth 3636, Minneapolis Convention Center, Minneapolis, MN

Please stop by our booth to discuss the incredible world of nanomaterials, nanodevices, nanoinstruments, and nano/micro scale surface characterization and your any unmet material analytical and testing needs with our staff scientists. We hope to see you soon!

Ebatco

Ebatco welcomes our new Analytical Chemist, Guillermo Turcios.

Mr. Turcios received his B.S. degree in Chemistry from Gustavus Adolphus College and is completing his Ph.D. in Chemistry remotely through Washington University in St. Louis. His undergraduate research focused on UV-Vis characterization of metal-ligand molecules where he measured the kinetic rate of ligands exchange with Cu(II) to understand coordination dynamics in solution. His Doctoral research centers on velocity map imaging of weakly bound molecular complexes. By exciting the complex into the charge transfer (CT) state, he investigates the dissociation dynamics from a single-electron reaction event. The fundamental insight into CT systems provide a foundation relevant to a wide range of systems that utilize CT reactions. Throughout his Ph.D. studies, he has designed experiments, maintained and repaired laser and vacuum instrumentation, and performed data analysis on a daily basis. With his cheerful and polite disposition, he is excited to bring his hands-on experimental

expertise and analytical mindset to Ebatco as an analytical chemist.

Case

Study

**Subvisible Particulate Counting Using Light Obscuration
Technique
Following USP 787, 788 and 789**

Injectables and ophthalmic solutions contain three types of particulate matter: extrinsic, intrinsic, and inherent particles. Extrinsic particles are unexpected foreign materials, such as cellulose. Intrinsic particles result from product processes, such as contamination from lubricants, manufacturing hardware, or product/packaging instability. Inherent particles are formulation components or protein particles. To ensure the health and safety of those who use the injectable or ophthalmic solutions and to pass the proper regulatory guidelines, rigorous quality control testing is required. One of those testing techniques is particle counting via light obscuration.

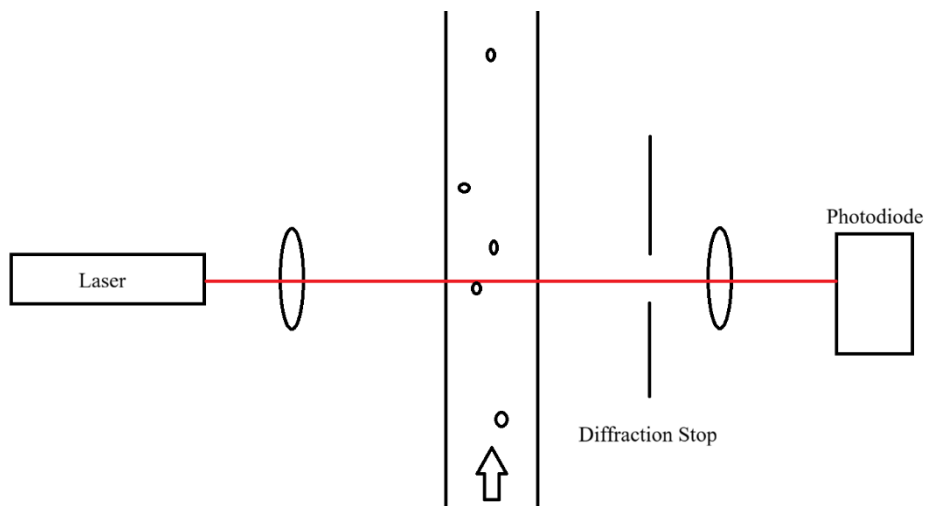


Figure 1. Schematic diagram of the light obscuration technique setup.

The light obscuration technique, with a typical schematic diagram shown in Figure 1, is used for the United States Pharmacopeia (USP) Chapters <787> Subvisible Particulate Matter in Therapeutic Protein Injections, <788> Particulate

Matter in Injections, and (789) Particulate Matter in Ophthalmic Solutions to determine the sizes and concentrations of particulates in injectables and ophthalmic solutions. The technique relies on a beam of light passing through a test chamber and onto a detector. When a particle suspension liquid sample is drawn through the test chamber, particles in the sample partially obscure the light beam and lower the intensity of light detected at the detector. From the magnitude, duration, number of the light intensity drops, and a known liquid pumping speed, the size, total number, and concentration of the particles are determined. The technique is sensitive and is optimal for samples with a low concentration of particulate matter.

Ebatco's NAT Lab is equipped with a Beckman Coulter HIAC 9703+ Particle Counter, which uses the light obscuration technique. With the current configuration, the HIAC 9703+ can measure particles between 1.3 and 150 μm in diameter, and concentrations between 0 and 18,000 particles per milliliter. According to Beckman Coulter, the instrument is in full compliance with USP 787, 788, and 789. It can support USP 787 tests with an aliquot volume as small as 0.2 mL.

In this Application Note, Ebatco tested deionized water drawn through disposable polypropylene syringes, glass syringes, and glass beakers to determine compliance with the three USP chapters. Aliquots of 1 mL each were tested in accordance with USP 787, and aliquots of 5 mL each were tested in accordance with USP 788 and 789. USP 787 requires that the test environment, such as beakers or syringes, have less than 1 particle greater than 10 μm in diameter per milliliter when tested with deionized water. USP 788 and 789 require that there be less than 25 particles greater than 10 μm in diameter between five aliquots of 5 mL each, which is equivalent to less than an average of 1 particle per milliliter. The test results are reported in Table 1. The glass syringes and glass beakers both passed the USP 787, 788 and 789 environmental requirements. The disposable polypropylene syringes did not pass the USP 787, 788, or 789 environmental requirements. As such, the disposable polypropylene syringes tested here are not deemed suitable for use with therapeutic protein injections. Additionally, the

disposable polypropylene syringes' particle concentration was found to be notably higher when tested with a lower sample volume.

Table 1 Average USP 787, 788, and 789 Results for Each Sample

Sample	USP 787			USP 788 & 789		
	Average (#/mL)	St. Dev. (#/mL)	PASS/FAIL	Average (#/mL)	St. Dev (#/mL)	PASS/FAIL
Disposable Polypropylene Syringes	14.43	7.56	FAIL	3.32	1.20	FAIL
Glass Syringe	0.47	0.32	PASS	0.57	0.32	PASS
Glass Beaker	0.03	0.10	PASS	0.11	0.05	PASS

When performing subvisible particulate counting following USP 787, 788, and 789 using the light obscuration technique to test injectables and ophthalmic solutions, limiting the introduction of particles from the testing environment is extremely important. Based on this limited study, disposable syringes may introduce particles from packaging or lubricants, and as such may not be suitable for USP 787, 788, or 789 sample handling. Glassware, when thoroughly cleaned, has little impact on particle counts and is preferable.

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info@ebatco.com.

Ebatco, 10025 Valley View Road, Suite 150, Eden Prairie, MN
 55344, USA

+1 952 746 8086 | info@ebatco.com | www.ebatco.com