

Producing Stable Nanoemulsions Utilizing Microfluidizer[®] Processors

TB-NE-1

Microfluidizer processors achieve unparalleled results producing stable emulsions with droplet sizes in the submicron to nanometer range for a variety of applications:

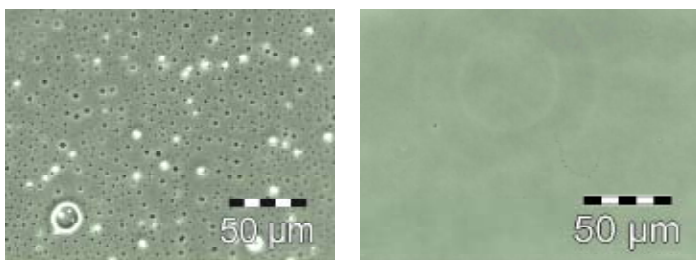
- Increased bioavailability
- Delivery of hydrophobic drugs
- Improved stability for new and existing products
- Simplified downstream processing (e.g. sterile filtration)
- Optimized formulation characteristics (e.g. rheology, optical, odor and taste masking properties)
- Nanoencapsulation for protection against oxidation

The Microfluidizer Processor Difference

- Produces smallest particle size and tightest distribution for stable results
- Highest shear force means less processing
- Reproducible results, batch to batch, day to day
- Scaleup guaranteed

Particle Size Reduction

Microfluidizer high shear fluid processors provide unrivaled uniform particle size reduction. Nanoemulsions with small particle sizes increase bioavailability and enable targeting (e.g. cancer drugs targeting and penetrating cancer cells.)

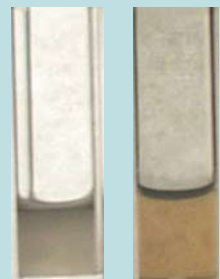


Before

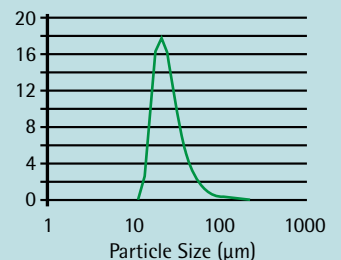
After



LV1 Microfluidizer processor for processing 1 - 6 ml of product



Formulation is translucent after processing.



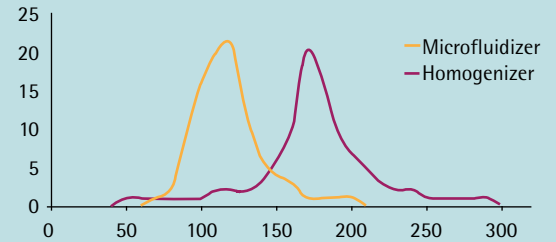
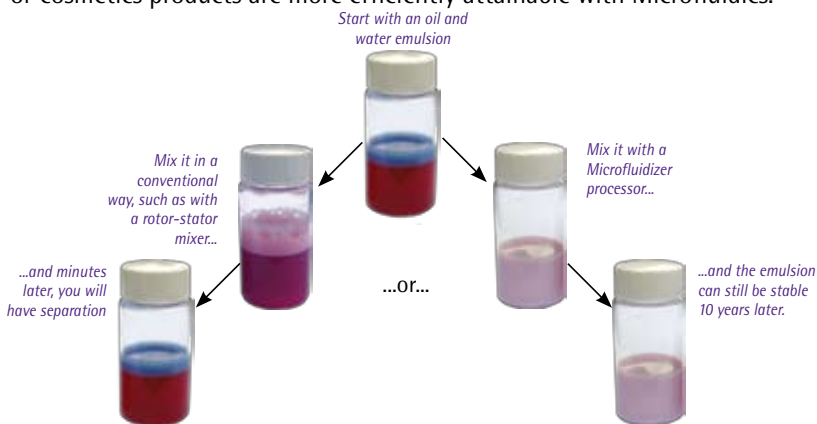
Median particle size (D50) AFTER: 45 nm. All particles are below 100 nm.

Sterile Filtration

In addition to the inherent cost benefits of developing products with a prolonged shelf life, customers are usually able to reduce the processing time needed to reach particle size goals as compared to homogenizers, and typically can simplify downstream processing steps, as well. For pharmaceuticals, applications such as vaccine adjuvants are often nanoemulsions which need to be sterile filtered. Uniformly reducing particles to < 200 nm significantly reduces filter area required. Scaling up with Microfluidizer processors brings these cost benefits to production volumes.

Improved Stability and Scaleup Guaranteed

Instability and phase separation of emulsions and suspensions are the critical challenges faced by research and production teams, as most technologies cannot produce the particle size distribution necessary to reach product goals. Large particles, even in small amounts, destabilize emulsions. To overcome these issues, Microfluidizer processors use unique fixed-geometry interaction chambers to reduce particle sizes uniformly and to a level unmatched by other methods. This enables customers to optimize formulations for maximum stability with scaleup guaranteed and easy to achieve, even for those requiring FDA approval. Further, quality enhancements such as translucent appearances for food or cosmetics products are more efficiently attainable with Microfluidics.



In this sterile filtration of a nanoemulsion for vaccine adjuvant, the emulsion processed by the Microfluidizer processor contain less than 1% of particles by volume > 200 nm. Emulsions processed with the homogenizer contained a significant amount of particles over 200 nm, therefore were difficult to filter sterilize.

