

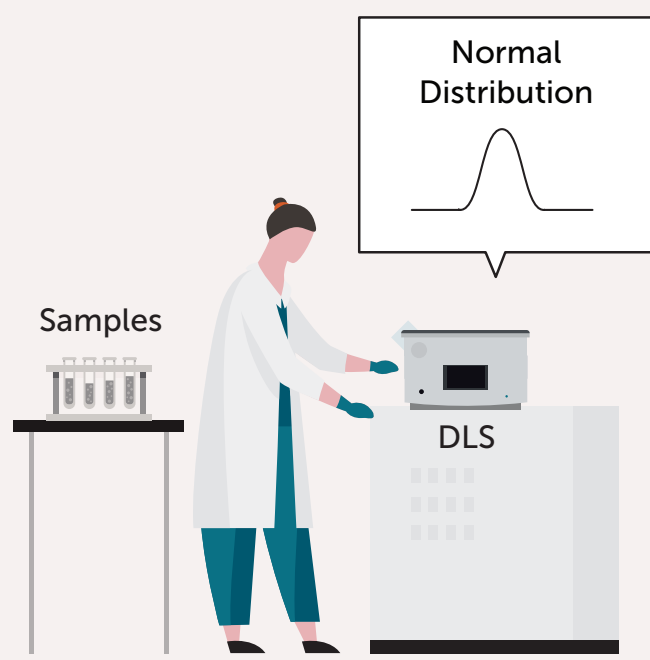
# Online Particle Size Analysis: Ensuring Consistent Quality and Throughput Using Real-Time Data

Sensitive processes often rely on precise measurement of nanoparticle size. Here, getting real-time data from an online source is vastly more efficient than sampling the process stream and using an offline laboratory. With precise online measurement, process changes can be made in minutes rather than hours or days. Here's how it works:

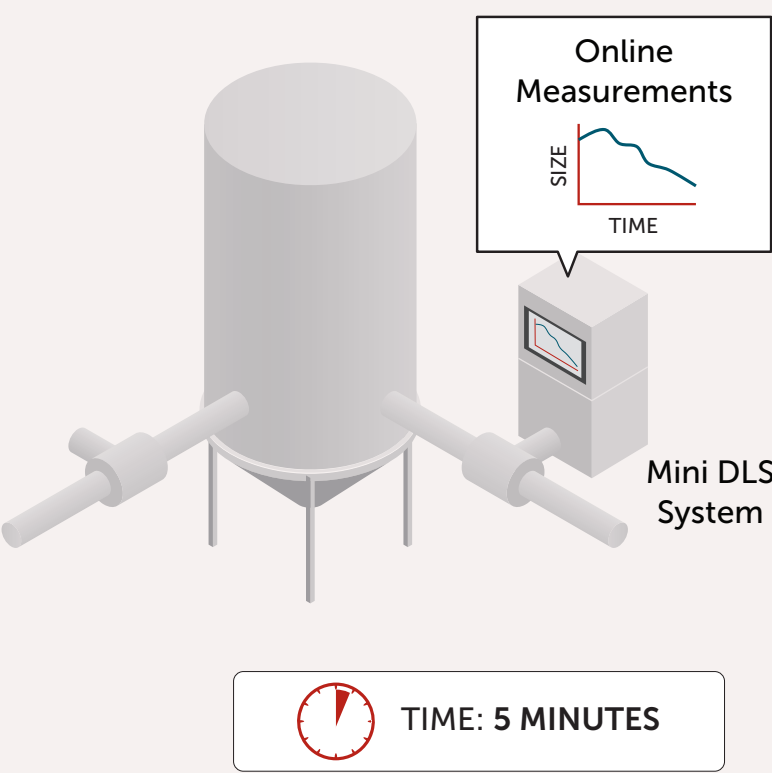
## OFFLINE LAB MEASUREMENTS

A sample is taken from the process stream and transported to a lab facility outside the process area, and then tested using dynamic light scattering (DLS).

The sample analysis can be resolved to multiple peaks, showing the presence of large and small particles. However, this process can take up to twenty-four hours to return results.



 TIME: 6-24 HOURS



 TIME: 5 MINUTES

## ONLINE MEASUREMENTS

With an online device installed, a sample can be taken directly from the process stream into the measurement tool. Here, an accurate particle distribution can be returned in near real-time.

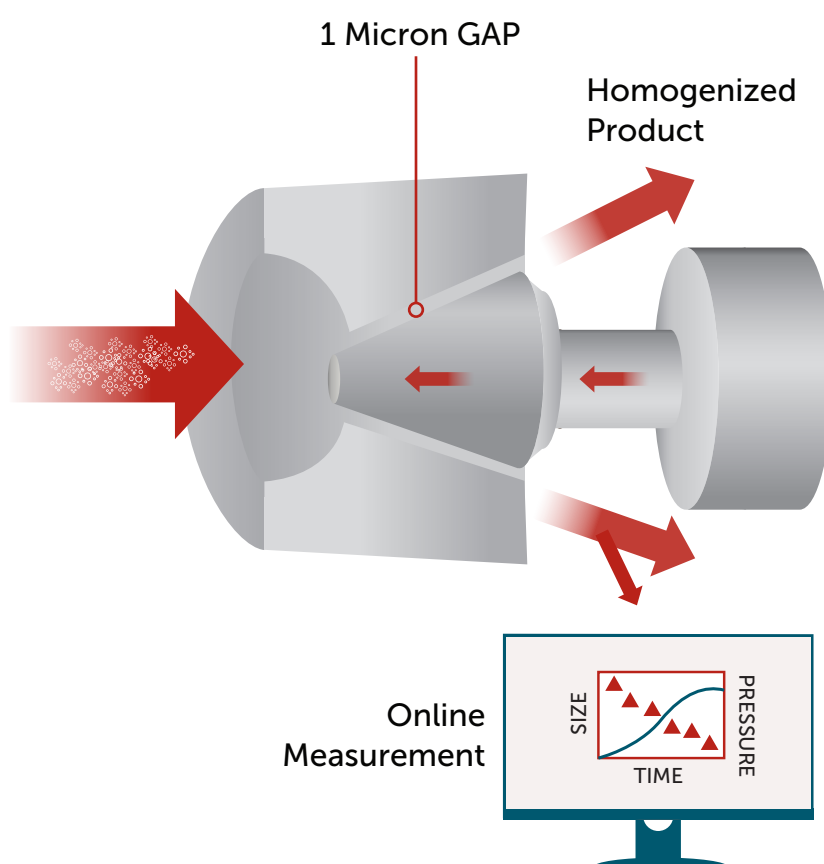
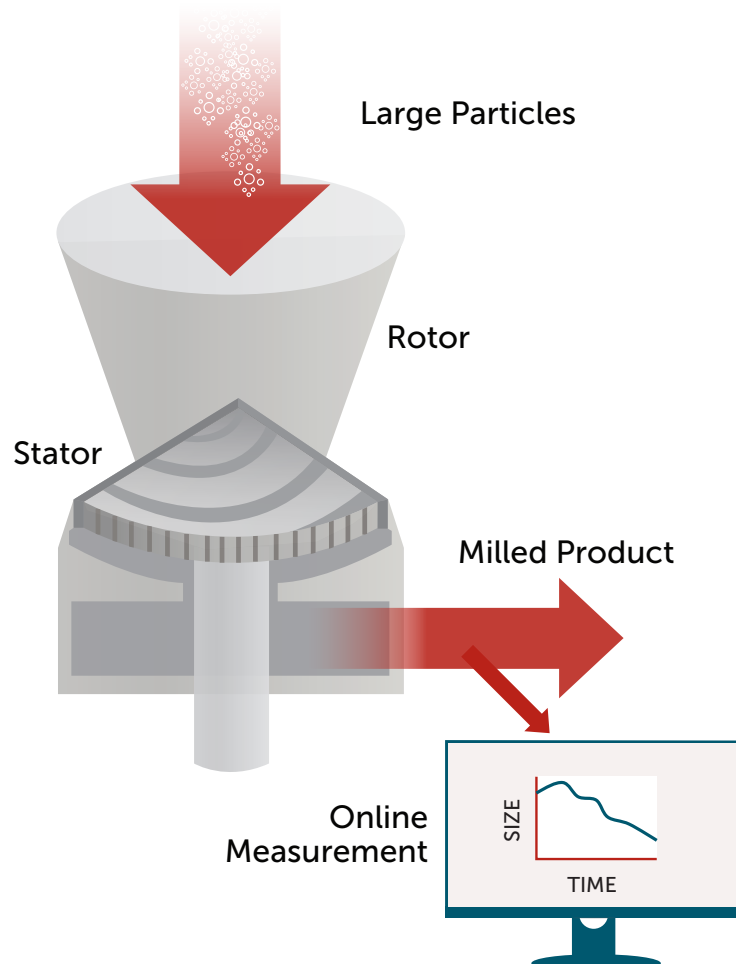
Process changes can be made immediately and continuously using real-time measurements.

## ONLINE DLS MEASUREMENTS FOR CRITICAL UNIT OPERATIONS

Implementing online DLS instrumentation can speed decision-making in multiple types of unit operations, allowing users to optimize processing time and determine consistent endpoints. In each of these operations, online DLS provides real-time data which decreases variability of particle sizes, ensuring consistent quality and yield.

### MILLING

- Solid particles in suspension are forced through a machine using rotors and stators at very high RPMs to pulverize particles and create viscous fluids with a smaller size distribution
- The end point is determined by the required particle size distribution
- The online analyzer can be used to determine when the end point is achieved

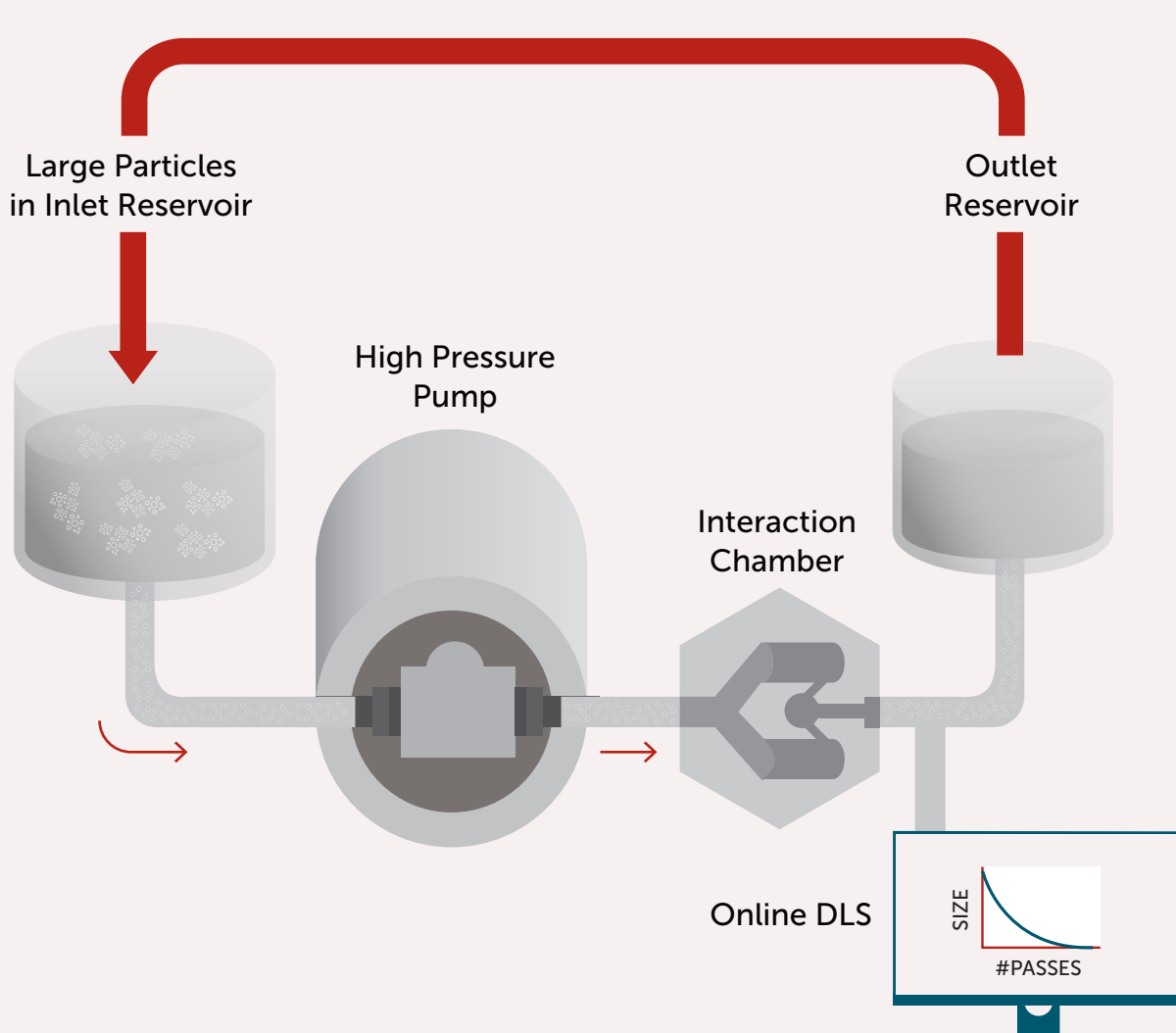


### HOMOGENIZATION

- Droplets in suspension are accelerated to use high pressure, turbulence, and shear forces to reduce particle sizes for increased efficacy of products and stability
- The online analyzer can be used to determine the optimum pressure for the desired size

### MICROFLUIDIZATION

- High pressure, shear, and impact are used to reduce particles and fibers at the nanoscale
- The online analyzer can be used to optimize both the operating pressure and the number of passes required to achieve the desired particle size



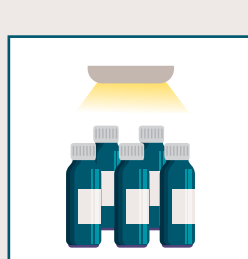
When used as part of a continuous process, online DLS measurement enables users to determine the optimum process conditions for their desired particle size.

- Control size reduction steps based on particle size, not indirect process parameters
- Minimize energy consumption, maximize quality and profits

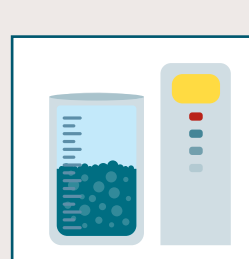
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Choose a Use Case  
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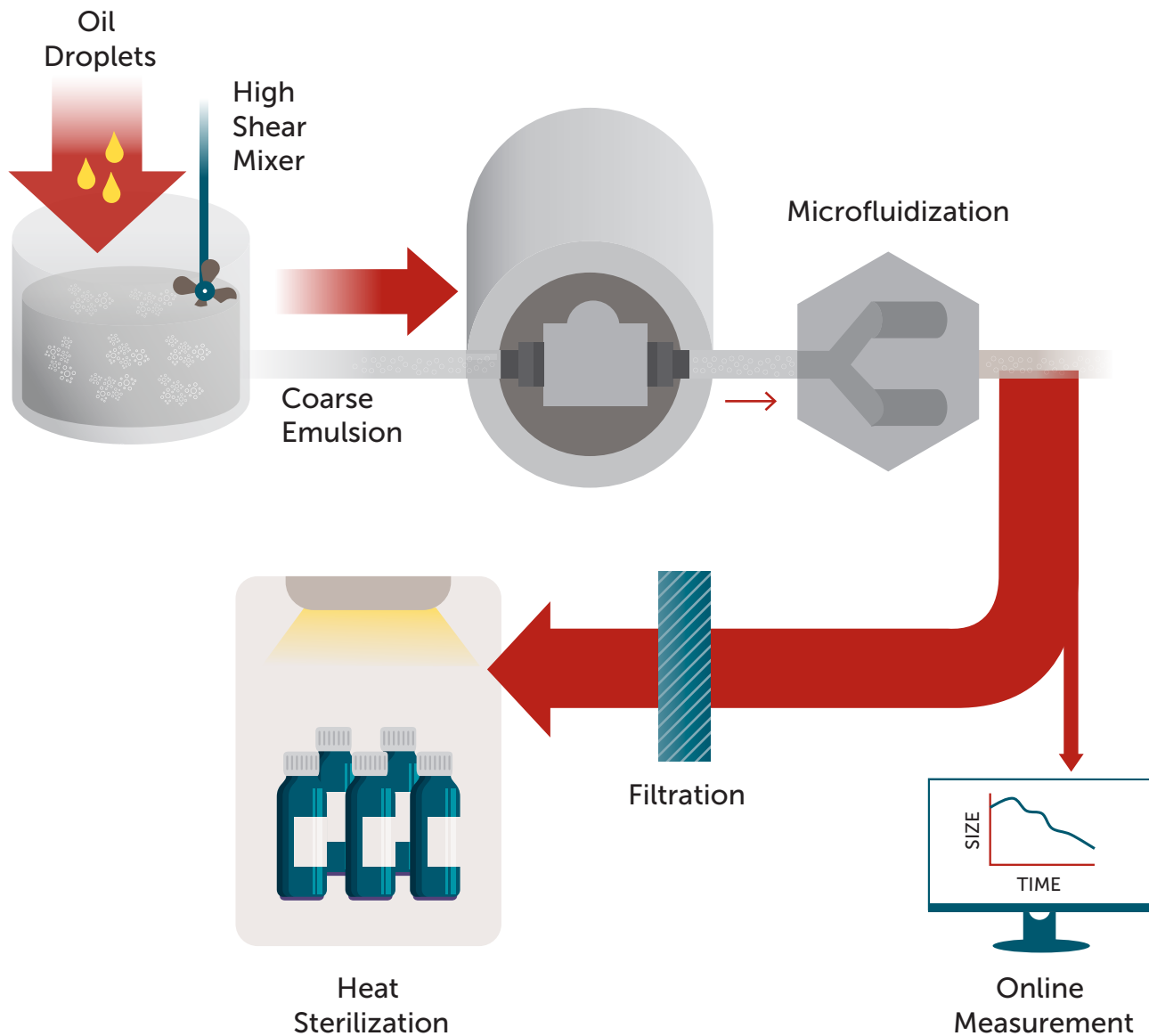
Pharmaceutical Emulsion



Process Innovation and Scale-up

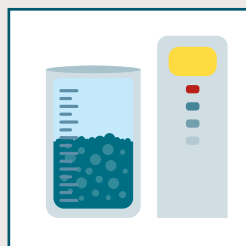
# Online Particle Size Analysis: Creating Pharmaceutical Emulsions

The dispersed phase droplet size is critically important to the efficacy and stability of emulsions. Various types of process equipment are available for creating emulsions at both the laboratory and commercial scale. An example of an emulsification process is shown below.

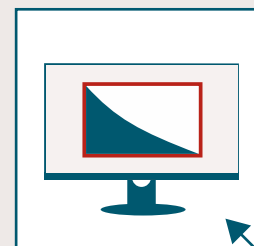


The pressure and number of cycles are critical to control the process to achieve the desired droplet size distribution. The Mini DLS system can be used to monitor the droplet size continuously rather than sending samples to the lab for analysis that takes hours. The online data can be used for continuous process control.

Choose a Use Case  
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Process Innovation  
and Scale-up

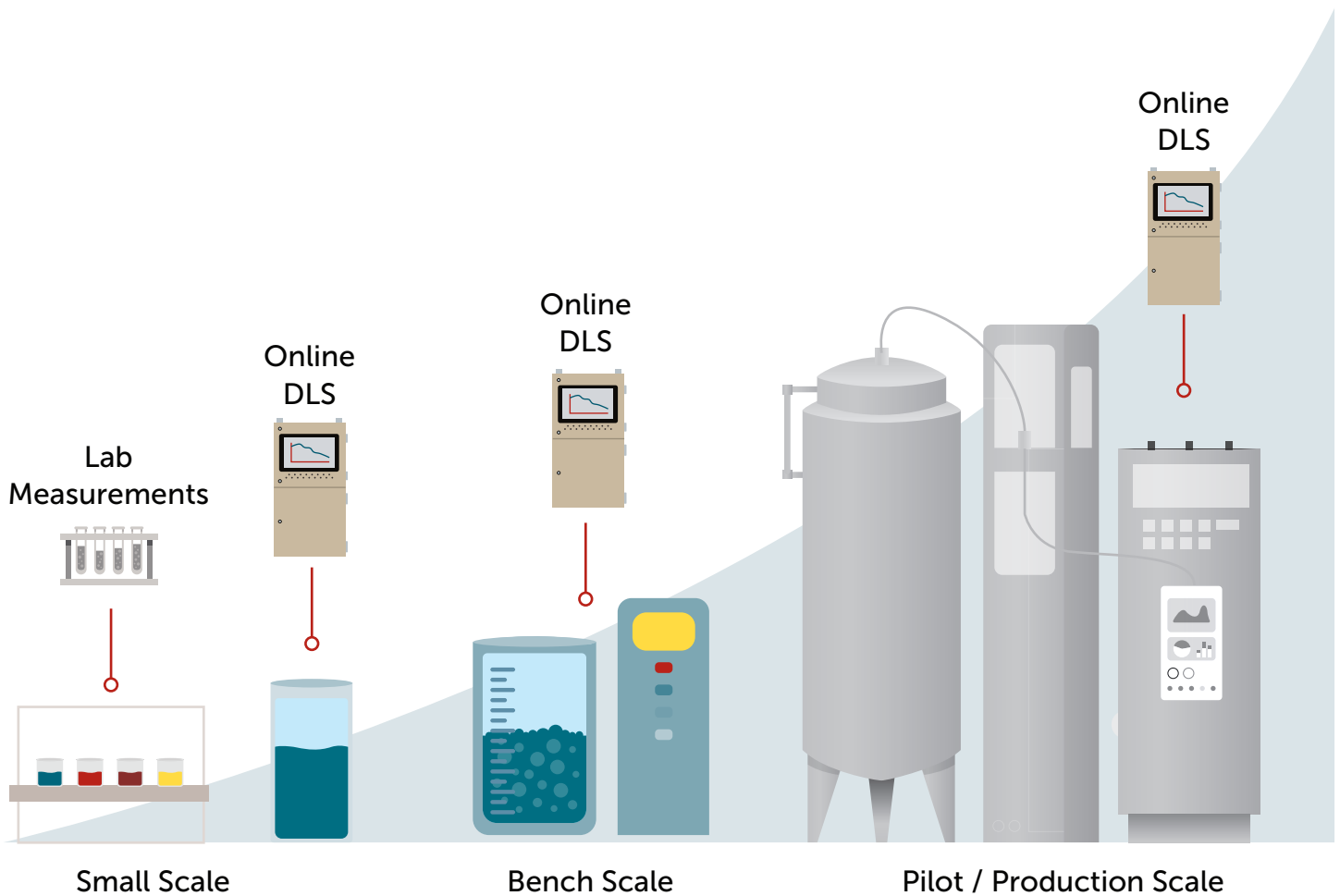


Back to Online Particle  
Size Analysis Pictogram

# Online Particle Size Analysis:

## Scaling from R&D to Production for Specialty Chemicals

Scaling up your particle production process from lab to pilot to full scale requires time, investment, and data. Online particle size data helps you scale up in a way that reduces time and expense by supplying online particle size information

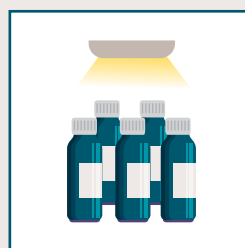


Benefits include:

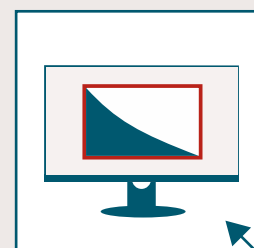
- Improve ability to optimize process conditions
- Improve ability to troubleshoot challenges
- Achieve steady-state operation to stay within product specifications

With online, real-time DLS measurements you can add significant control to your nanoparticle-based processes. This can dramatically shorten the calendar time required to go to market, while adding process consistency and increasing yield.

Choose a Use Case  
for More Detail



Pharmaceutical  
Emulsion



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Size Analysis Pictogram