

The Sonolator in print

From - **Handbook of Coatings Additives, Second Edition**

By John J. Florio, Daniel J. Miller 2004

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Section 11.2.1.1

“Because of the fluffy nature of fumed silica, care must be taken to its incorporation, as the particles will readily become airborne. **Thorough mixing into the vehicle takes time; specially designed Sonolators greatly facilitate incorporation.** The degree of dispersing fumed silica is critical to the final rheological structure set up in a coating. Incorporation guidelines will be more thoroughly covered in section 11.3.2.1”

From - **Colloidal Dispersions: Suspensions, Emulsions and Foams**

By Ian D. Morrison, Sydney Ross 2002

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5.3.b Homogenizers

“A **Sonolator** is a low-pressure variation of the homogenizer (Figure 5.4). Liquids are pumped through a slit-shaped orifice at pressures up to 5000 PSI at high linear velocity against a stainless steel blade cantilevered in the jet stream. The dimensions of the equipment are such that the blade vibrates in the ultrasonic range causing cavitation, turbulence, and high shear in the liquid. **The Sonolator uses a less expensive pump because the pressure is as much as two-thirds less than what is normally required in homogenizers.** The position of the blade and the pressure drop are adjusted to produce a maximum in power, which is detected externally by a meter reading in decibels. **Dual-feed systems are used to bring two different liquids together just before they pass through the equipment. This is particularly advantageous when one of the liquids is a wax and needs to be kept hot before emulsification.”**

From - **Emulsions: Theory and Practice**

By Paul Becher 2001

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Ultrasonic Devices

“A variation of the piezocrystal type of equipment has been the invention of the so-called Pohlman “liquid whistle”, in which the principle of the organ-pipe has been applied to liquids (10). The basic construction of the unit is shown diagrammatically in figure 12.1d.

In a commercial version of this device (Manufactured by Sonic Corp.) a jet of liquid is driven through the elliptical orifice at approximately 300 ft/s, and passes over the bladelike obstacle. In its passage between the orifice and blade, the liquid sheds vortices perpendicular to the original flow directions. This shedding creates a steady sonic-range oscillation in the liquid, and the blade is thus forced into vibration at its resonant frequency.

As it vibrates, the stream of liquid is alternately forced up and down, and, if the frequency is sufficiently high (this depends solely on the dimensions and physical characteristics of the blade), powerful oscillations are set up in the liquid. These are strongest near the blade and it is in this region that emulsification takes place. In the commercial instrument, the cavitation is monitored by a probe and meter. An idea of the physical characteristics of the blade may be gleaned from the fact that in early experiments by Alexander (11) an ordinary razor blade was employed.

In figure 12.13 a typical layout for the production of oil and water emulsions employing the Pohlman whistle device, is displayed. Typically, with this device throughputs varying from as low as one gallon up to several hundred gallons per minute are possible.

Data has been presented to show that the use of ultrasound in emulsification results in small droplets size, as well as increased emulsion stability (12).

Singiser and Beal (13) examined the effectiveness of various emulsifying equipment some years ago and concluded that an ultrasonic emulsator based on the Pohlman whistle principle provided emulsions of the smallest particle size, most nearly homogeneous distribution of particle sizes, and ultimately, the best stability.”

From - **Encyclopedia of Emulsion Technology - Volume 3**

By Daniel Schuster 1988

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VIII Manufacturing Process

“Conventional method of assessing the effectiveness of an emulsifying machine is to determine the droplet size and distribution that it is capable of providing. Table 4 from our own laboratories shows some results for common emulsifying machines expressed as that droplet size which is larger than 75% by number of the droplets. It is apparent that the rotor-stator devices (colloid mill, Vertator) and the Hobart mixer are quite similar, while the liquid whistle type of device (**Sonolator**) produces much smaller droplets. This result is exactly what would be expected from studies on more normal emulsions.”

From - **Encyclopedia of Pharmaceutical Technology**

By James Swarbrick 2006

Page 3268

Emulsion Products

“Another in-line method of emulsification is the ultrasonic process, which uses a **Sonolator** and the principle of the Pohlman whistle. This process uses a very high-intensity mixing device that mechanically generate ultrasonic acoustic energy to produce emulsion and dispersions. Liquid to be processed is pumped through a special orifice forming a flat high-pressure stream. This jet impinges on the edge of a flat blade enclosed in a tube causing it to vibrate at ultrasonic frequencies. Cavitation produces violent local pressure changes that act on the liquid, causing instantaneous and intense dispersion of any immiscible liquids or insoluble particles. Water-in-oil emulsions are manufactured in the same equipment as O/W emulsions except that the phases are reversed in the equipment.”

From - Injectable Dispersed Systems: Formulation, Processing and Performance (Drugs and the Pharmaceutical Sciences)

By Diane J. Burgess 2005

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2.6. Ultrasonifiers

“The use of ultrasonic energy to produce pharmaceutical emulsions has been demonstrated, and many laboratory size models are available. These transduced piezoelectric devices have limited output and are relatively expensive. They are useful for laboratory preparation of fluid emulsions of moderate viscosity and extremely low particle size. Commercial equipment is based on the principle of the Pohlman liquid whistle (Fig. 6).”

“The dispersion is forced through an orifice at modest pressures and is allowed to impinge upon a blade. The pressures required range from approximately 150 to 350 psi and cause the blade to vibrate rapidly to produce an ultrasonic note. When the system reaches steady state, a cavitation field is generated at the leading edge of the blade, and pressure fluctuations of approximately 60 tons psi can be achieved in commercial equipment.”