

ULTRASONIC EQUIPMENT FOR SONOCHEMISTRY

The chemical effects of ultrasound are diverse and include dramatic improvements in both stoichiometric and catalytic reactions. In some cases, ultrasonic irradiation can increase reactivities by nearly a million-fold. It does so through the process of acoustic cavitation; the formation, growth and implosive collapse of bubbles in a liquid.

During cavitation collapse, intense heating of the bubbles occurs. The localized hot spots have temperatures in the range of 5000°C, pressures approaching 500 atmospheres, lifetimes of a few microseconds, and heating and cooling rates greater than 109 K/s.* Of special interest for sonochemistry research, is the fact that cavitation generates highly reactive free radicals that greatly enhance chemical reactions.

Applications for chemical reactions exist in both homogeneous liquids and in liquid-solid systems. Of special synthetic use is the ability of ultrasound to create clean, highly reactive surfaces on metals. Ultrasound has also been found to be beneficial for the initiation or enhancement of catalytic reactions, in both homogeneous and heterogeneous cases.

RECOMMENDED ULTRASONIC PROCESSOR

VC 505, VC 750, VCX 500 or VCX 750. Please see catalog for detailed description.

SONOCHEMICAL REACTION VESSELS

The adapter Part No. 830-00014 screws onto the special probe Part No. 630-0217 at the nodal point. The glass chamber slides onto the adapter and is secured in place as the bushing is screwed into the chamber compressing the O-ring. Moving the glass chamber up or down on the adapter allows the portion of the probe protruding out of the adapter to be immersed at the optimum depth into the sample.

4-10 ml reaction vessel.** Two 14/20 side necks. Supplied with bushing and O-ring. Glass chamber height: 4⁷/₈" (123 mm). Part No. 830-00011.

10-50 ml reaction vessel.** Bottom well capacity: 10 ml. Main body capacity: 50 ml. Two 14/20 side necks. Supplied with bushing and O-ring. Glass chamber height: 4³/₄" (120 mm). Part No. 830-00012.

40-250 ml reaction vessel.** Three 14/20 side necks. Supplied with bushing and O-ring. Glass chamber height: 6³/₈" (162 mm). Part No. 830-00013.

SPECIAL PROBE

½" (13 mm) special 10" (254 mm) long full wave solid probe. Used with the adapter below. Titanium alloy Ti-Al-4V. Autoclavable Part No. 630-0217.

ADAPTER

5" (127 mm long). Stainless steel. Internally threaded. Screws onto a full wave 10" (254 mm) long ½" (13 mm) probe at the nodal point. Part No. 830-00014.

* From an article by Dr. Kenneth Suslick, Professor of Chemistry and Beckman Institute Professor, University of Illinois Urbana/Champaign.
** Must be used with the adapter Part No. 830-00014 and probe Part No. 630-0217 listed above.



3-10 ml Vessel
830-00011



10-50 ml Vessel
830-00012



40-250 ml Vessel
830-00013



Adapter
830-00014