

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.*

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.

SONOCHEMICAL REACTION VESSELS

The Suslick reaction vessel consists of a glass chamber and a stainless steel fitting. Three side ports accept septum for syringe charging or retrieval. The fitting screws onto a standard solid ½" (13 mm) probe Part No. 630-0219, or threaded end ½" (13 mm) probe** Part No. 630-0220 at the nodal point. The glass chamber slides into the adapter and is held in place by an internal O-ring. With the other reaction vessels, the adapter Part No. 830-00014 screws onto special probe Part No. 630-0217 or 630-0218** at the nodal point. The glass chamber slides up and down on the adapter as required, and is held in place by the action of a threaded nylon bushing compressing an 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 Suslick reaction vessel. Glass chamber height: ¾" (82 mm). Part No. 830-00007.

4-10 ml reaction vessel.*** Two 14/20 side necks. Supplied with bushing and O-ring. Glass chamber height: 4⅞" (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: 4¾" (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: 6⅜" (162 mm). Part No. 830-00013.

SPECIAL PROBES

½" (13 mm) special 10" (254 mm) long full wave solid probe. Recommended when processing samples containing organic solvents or low surface tension liquids. Used with the adapter below. Titanium alloy Ti-Al-4V. Autoclavable Part No. 630-0217.

½" (13 mm) special 10" (254 mm) long full wave probe with threaded end, and replaceable tip.** Used with the adapter below. Titanium alloy Ti-6Al-4V. Autoclavable Part No. 630-0218.

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

** Do not use a probe with replaceable tip when processing samples containing organic solvents or low surface tension liquids.

*** Must be used with the adapter Part No. 830-00014 and special probes listed above.



Suslick Vessel
830-00007



3-10 ml Vessel
830-00011



10-50 ml Vessel
830-00012



40-250 ml Vessel
830-00013



Adapter
830-00014