

## Sonochemical Apparatus

### For Ultrasound High Energy Chemistry

**Chemists of all disciplines have recently discovered that ultrasound can be used to promote and enhance chemical reactions, and the word they commonly use to describe this phenomenon is SONOCHEMISTRY.**

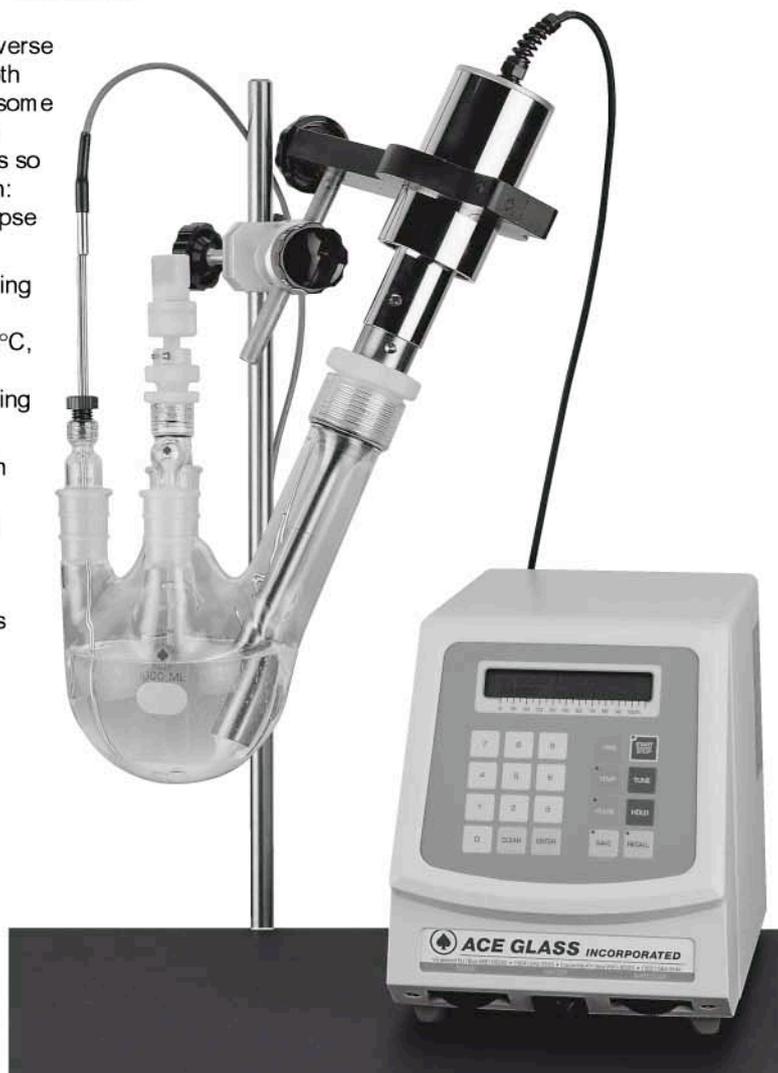
The chemical effects of ultrasound are diverse and include dramatic improvements in both stoichiometric and catalytic reactions. In some cases, ultrasonic irradiation can increase reactivities by nearly a million-fold. It does so through the process of acoustic cavitation: the formation, growth and implosive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

During cavitational collapse, intense heating of the bubbles occurs. The localized hot spots have temperatures of roughly 5000°C, pressures of about 500 atmospheres, lifetimes of a few microseconds, and heating and cooling rates greater than 10<sup>9</sup> K/s.

Applications to 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 found important uses for initiation or enhancement of catalytic reactions, both homogenous and heterogeneous cases.

From an article by Dr. Kenneth S. Suslick, Professor of Chemistry and Beckman Institute Professor, University of Illinois at Urbana/Champaign 61801, in *Science*, Vol. 247, pages 1439-1445. Also Dr. Suslick has authored an article on ultrasound in *Scientific American*, February 1989, Vol. 260, pages 80-86, as well as a 1988 text, *Ultrasound, Its Chemical, Physical and Biological Effects*, VCH Publishers, NY, NY.



Originally, because of their availability, conventional, low power ultrasonic cleaning baths were used in the laboratory for Sonochemical investigations. Although these baths were somewhat effective with very reactive metals, the intensity was not localized and insufficient for most Sonochemical reactions. In addition, variables such as level and temperature of the liquid, position within the bath, and inconsistency of power output were numerous, rendering the results hardly quantifiable.

More recently, all serious Sonochemical investigations have been conducted with high power ultrasonic probes that focus the vibrations into the liquid, allowing a variety of synthesis to be produced, and higher yields to be achieved. Typically, with high power ultrasonics, the vibrating probe is immersed directly in the reactive medium inside a sealed flask, specially designed to allow the introduction of samples in a gas-tight manner.

## Equipment for Sonochemistry

### How It Works

The ultrasonic power supply (generator) converts 50/60 Hz voltage to high frequency 20 kHz (20,000 cycles per second) electrical energy. This electrical energy is transmitted to the piezoelectric transducer within the converter, where it is changed to mechanical vibrations. The vibrations from the converter are intensified by the horn (probe), creating pressure waves in the liquid. This action forms millions of microscopic bubbles (cavities) that expand during the negative pressure excursion, and implode violently during the positive excursion. It is this phenomenon, referred to as "cavitation," which produces the powerful shearing action at the horn tip and causes the molecules in the liquid to become intensely agitated.

### Ultrasonic Power Supply

Features an automatic amplitude and frequency control circuitry that eliminates the need for constant adjustments and assures optimum cavitation at any power level. All the researcher has to do is set the power level and the duration of exposure. The energy emitted is displayed on an analog power monitor, enabling processing parameters to be accurately recorded for future reproduction.

A microprocessor-based timer with pulsing capabilities (750W only) programs the unit in terms of both duration and duty cycle, permitting heat sensitive samples to be processed at full intensity without unnecessary bulk heating. Six ranges enable the timer to be accurately programmed from 0.1 second to 999 hours. For batchwork, a pre-selected program can easily be recalled by pressing a reset button. The timing sequence is continuously monitored and displayed on a digital readout.

For hands-off operation, a connector is provided to enable the unit to be remotely activated with a footswitch. RF filtering is used throughout to assure compliance with FCC, VA and OSHA rules and regulations governing radio interference and current leakage. For dependable performance and reliability, the power supply is fully transistorized and features proprietary Stall Prevention Circuitry. Wattage ratings are RMS (average) — not peak-to-peak.

### Converter

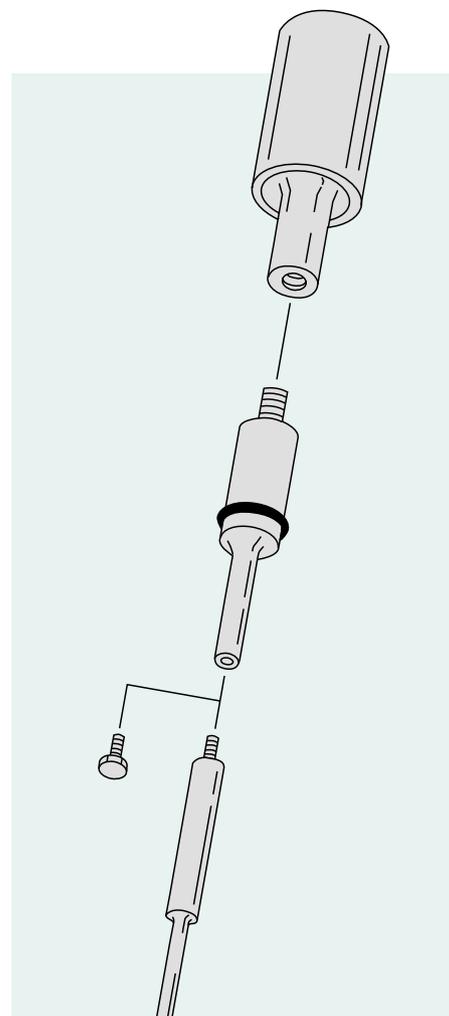
Supplied with the power supply, the converter is fanless and designed for heavy duty operation. The piezoelectric ceramic crystal within the converter is fabricated of lead zirconate titanate.

### Horn (Probe)

The horn, ordered separately, radiates and focuses the ultrasonic energy into the liquid. Horns with smaller tip diameters produce greater intensity of cavitation, but the energy released is restricted to a narrower, more concentrated field immediately below the tip. Conversely, horns with larger tip diameter produce reduced intensity, at a given power setting, but the energy is released over a greater area. The larger the tip diameter, the larger the volume that can be processed. The application and nature of the material being processed usually dictate the horn size, i.e. 1/2", 3/4" or 1", and their intensity — high, medium or low, respectively. For processing very difficult samples, this intensity can be doubled by connecting a booster between the converter and the horn.

Fabricated from high grade titanium, these horns are autoclavable and available with solid tips or threaded ends to accept replaceable tips, extenders (for deeper vessel penetration) or microtips (for small samples between 3-10 mL).

When cavitation erosion is excessive at the tip, replacement will be necessary. With solid tip probes, you would need to replace the entire probe; with removable tip probes, you need only replace the tip. Periodic maintenance should be performed on the tip by polishing with light emery when wear occurs and can be repeated until difficulties are encountered when tuning the power supply.



A unique feature of the ACE Horn is an O-Ring groove at the nodal point (point of no activity) that allows the horn to be held in an Ace-Thred without affecting sonic output and enables easy adaptation to a multitude of glass reaction vessels. (These designs have been developed with the advice and assistance of Professor Kenneth S. Suslick, University of Illinois at Urbana-Champaign).

#### Three-Year Unconditional Warranty

**The power supply and converter are protected by a full, 36-month, unconditional warranty.** In the event that a failure should occur during that period, we will repair the unit without charge for parts and labor. This liberal warranty — the most comprehensive in the industry — is an expression of confidence in ACE equipment to provide dependable service, and a tangible example of our commitment to quality and user satisfaction.

**9810-22**

### 9810 POWER SUPPLY, Sonochemical ★

Ultrasonic power supply for sonochemical research with automatic amplitude and frequency control circuitry that eliminates the need for constant adjustments, assuring optimum cavitation at any power level. Available in 750W or 1500W.

1500W model is single output and features a microprocessor-controlled timer with digital display, variable power output control, analog power monitor display, chrome plated converter, tool kit and instruction manual.

750W is new space-saving design with auto tuning that matches the power supply to the converter/probe assembly and does not have to be manually tuned each time the probe is changed or the unit is turned on, exclusive energy (Joule) monitoring circuit, nonvolatile memory function for storing up to ten preset operating programs, tactile keypad with user friendly menu-driven LCD display, elapsed time/run time timer, and power (watts) readout.

Three-year unconditional warranty on power supply and converter. Supplied with detailed operating instructions. **NOT** supplied with horn or glass reactors.

	Ordering Code	Each
750 Watt Power Supply and Converter	<b>9810-24</b>	★4095.00
1500 Watt Power Supply and Converter	<b>9810-40</b>	★8868.64

**750W** Model for smaller volumes and continuous flow volumes up to 5 gallons/19 liters per hour. Also features ON/OFF 0.1 to 10 seconds pulser, a one-second to 10-hour timer, and integral temperature controller to prevent overheating of sample. Power input is 117v, 5.5amps, 50/60Hz. Not supplied with Temperature probe; to order, see 9810-50 or -55. Weighs 15 lbs. (6.8 kg.) and measures 7<sup>1</sup>/<sub>2</sub>" x 13<sup>1</sup>/<sub>2</sub>" x 8<sup>1</sup>/<sub>2</sub>" (19 x 34 x 26.6cm).

**1500W** Model for difficult samples, large volumes and continuous flow volumes up to 150 gallons/567 liters per hour, has an overload protection circuit. Power input is 220v, 7.5 amps, 50/60 Hz. Weighs 49 lbs. (22.2kg) and measures 6<sup>1</sup>/<sub>2</sub>" x 17" x 22<sup>1</sup>/<sub>2</sub>" (16.5 x 43.2 x 57 cm).

**5028**

### 5028 ADAPTER, Temperature Probe, "Mini" #7 Ace-Thred ♠

With § inner joint at bottom and #7 Ace-Thred at top. For use with 9810-50 or -55 Temperature Probes to secure probe in reaction vessel joint. Supplied complete with Nylon bushing and PTFE ferrule to make a leak-tight compression seal. For replacement ferrules, see 11710-03.

§ Joint Size	Ordering Code	Each
14/20	<b>5028-27</b>	18.73
24/40	<b>5028-31</b>	18.81

**9814 HORN, Sonochemical ★**

Basic sonochemical horns (probes) that focus the ultrasonic energy into the liquid. For use with 9810 Power Supplies. Fabricated from high grade titanium, these horns are autoclavable and have an O-Ring groove at nodal point that allows a tight fit in #36 Ace-Thred without affecting sonic output. Available with solid end (fixed length) or threaded end to accept replaceable tips, microtips or extenders. Supplied with 1/2"-20 stud for connection to converter on power supply.

Tip Diameter	1/2"	1/2"	3/4"	3/4"	1"	1"
Type End	Solid	Threaded	Solid	Threaded	Solid	Threaded
Length Below Groove*	2 1/2"	2 1/2"	2 3/8"	2 3/8"	2"	2"
Intensity	High	High	Medium	Medium	Low	Low
Volume (batch)	10-250mL	10-250mL	25-500mL	25-500mL	50-1000mL	50-1000mL
Amplitude (micro meter)**	120	120	60	60	30	30
<b>Ordering Code</b>	<b>9814-06</b>	<b>9814-25</b>	<b>9814-08</b>	<b>9814-27</b>	<b>9814-11</b>	<b>9814-30</b>
Each	★672.06	★694.54	★715.43	★737.11	★758.77	★780.47



**9814**

\*Length below groove for threaded horn is with removable tip.  
 \*\*With output control set at 10.

**9816 EXTENDER, Sonochemical ★**

Titanium extender screws into threaded end of sonic horn. This accessory lengthens the horn (probe) by 5" or 10" for more versatility. Extenders have solid ends. 1/2" extender has single groove on 5" size and two grooves on 10" size for use with #15 Ace-Thred. 3/4" and 1" extenders do **NOT** have grooves. Order extender diameter to match horn diameter.

Extender Dia.	1/2"	1/2"	3/4"	1"	1"
Length	5"	10"	5"	5"	10"
<b>Ordering Code</b>	<b>9816-06</b>	<b>9816-21</b>	<b>9816-08</b>	<b>9816-10</b>	<b>9816-27</b>
Each	★362.34	★594.72	★388.53	★412.34	★594.72



**9816**

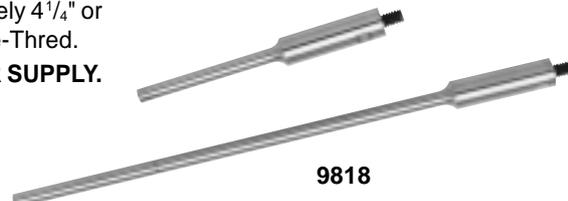
**9818 MICROTIP, Sonochemical ★**

1/4" stepped microtip fabricated from titanium for processing samples as small as 3 mL. This solid end microtip threads **ONLY** into 1/2" threaded horn. Overall length, approximately 4 1/4" or 9 3/4". 9818-23 Microtip has groove 2 1/2" from bottom that accommodates a #7 Ace-Thred.

**IMPORTANT:** When using microtips, do not exceed "MICROTIP LIMIT" ON POWER SUPPLY.

Length	Intensity	Volume (Batch)	Amplitude*	Ordering Code	Each
5" (4 1/4")	high	3-10mL	120	<b>9818-17</b>	★241.66
10" (9 3/4")	high	2-10mL	120	<b>9818-23</b>	★679.67

\*In micro meters with output control set at 5.



**9818**

**9820 TIP, Replaceable, Titanium, Sonochemical ★**

Tips showing signs of wear should be polished with fine emery cloth. This procedure can be repeated until difficulties are encountered when tuning the power supply, then tips should be replaced. For use with threaded horns only. Supplied in box of five tips.

For Horn Size	Ordering Code	Per Box
1/2"	<b>9820-12</b>	★181.24
3/4"	<b>9820-14</b>	★196.35
1"	<b>9820-18</b>	★343.07

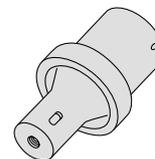


**9820**

**9822 BOOSTER ★**

When connected between the converter and 9814 Horn, the booster increases the amplitude of vibration at the horn tip by a factor of two. Use to process very difficult applications. **NOT** for use with 9818 Microtip.

<b>Ordering Code</b>	Each
<b>9822-20</b>	★415.37



**9822**

**9824 FOOTSWITCH ★**

For use with 9810, 600W or 1500W Power Supply, to enable hands-off operation.

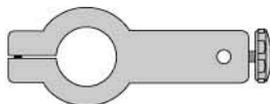
NOT ILLUSTRATED.

<b>Ordering Code</b>	Each
<b>9824-43</b>	★80.87

**9825 CLAMP, Heavy Duty ★**

For mounting converter securely in place. Fabricated from 3/4" thick aluminum, anodized black, this clamp fits 1/2" or 5/8" diameter rod and is secured by an Allen head screw to 2 1/2" diameter (600W) converter.

<b>Ordering Code</b>	Each
<b>9825-21</b>	★196.44



9825

**9826 WRENCH SET, Replacement ★**

Replacement wrench set used to assemble sonic horn to converter on power supply. Consists of two spanner-type wrenches that grab at the drilled holes on the horn and converter. NOTE: This wrench set is normally supplied with the 9810 Power Supply.

NOT ILLUSTRATED.

<b>Ordering Code</b>	Each
<b>9826-14</b>	★108.76



9830

**9830 REACTION ASSEMBLY, Sonochemical, Small Volume, Complete ★**

Complete reaction assembly with parts necessary to perform sonochemical reactions from 3mL to 200mL.

Includes three borosilicate reactors, power supply with converter, 1/2" horn, 1/2" extender, 1/4" microtip, slide adapter and clamp.

For details of each item, see individual listings.

Includes:

9810-22	9816-06	9825-21	9833-05	9844-07
9814-25	9818-17	9852-21	9843-04	(4) 7506-10

<b>Ordering Code</b>	<b>COMPLETE</b>
<b>9830-25</b>	★6017.27



9831

**9831 REACTION ASSEMBLY, Sonochemical, Large Volume, Complete ★**

Complete reaction assembly with parts necessary to perform sonochemical reactions from 250mL to 1800mL.

Includes three borosilicate reactors, power supply with converter, 3/4" horn, 3/4" extender, slide adapter and clamp.

For details of each item, see individual listings.

Includes:

9810-22	9816-08	9833-12	9837-20
9814-27	9825-21	9833-16	(3) 7506-12

<b>Ordering Code</b>	<b>COMPLETE</b>
<b>9831-40</b>	★5908.42

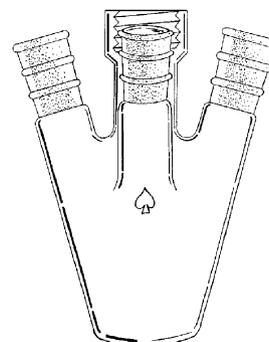
**9833 REACTION VESSEL, Sonochemical, Tapered, 4-Neck ▲**

Fabricated from borosilicate glass with walls tapered inward toward bottom to allow operation with smaller volumes. 250 mL size supplied with #25 Ace-Thred center neck and three  $\frac{3}{4}$ "/20 side necks. All other capacities supplied with #36 Ace-Thred center neck and three  $\frac{3}{4}$ "/40 side necks. Use 7506-10 Bushing and O-Ring in #25 Ace-Thred, 7506-12 Bushing and O-Ring in #36 Ace-Thred to form a leak-tight compression seal with all 9814 Horns with groove and 9852-41 or 9852-45 Slide Adapter. Stated capacity is WITHOUT horn.

**See Horn Selection Chart for proper horn size.**

Vessel NOT supplied with bushing or O-Ring, order separately.

Cap., mL	Ordering Code	Each		Ordering Code	Each
250	<b>9833-05</b>	128.33	#25 Nylon Bushing		
500	<b>9833-12</b>	142.21	w/FETFE O-Ring, only	<b>7506-10</b>	13.37
1000	<b>9833-16</b>	155.46	#36 Nylon Bushing		
2000	<b>9833-21</b>	172.83	w/FETFE O-Ring, only	<b>7506-12</b>	31.72



**9833**

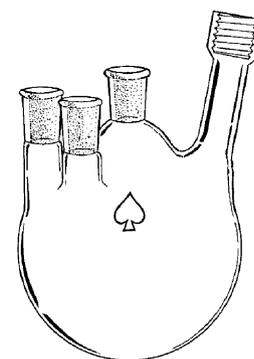
**9837 REACTION VESSEL, Sonochemical, Round Bottom, 4-Neck ▲**

Borosilicate glass, round bottom reaction vessel. Supplied with  $\frac{3}{4}$ "/40 center neck and two  $\frac{3}{4}$ "/40 side necks. Fourth neck is #25 Ace-Thred on 500 mL for use with 7506-10 Bushing and O-Ring; #36 Ace-Thred on 1000 mL and 2000 mL sizes for use with 7506-12 Bushing and O-Ring to make a leak-tight compression seal with all 9814 Horns and 9852-41 or 9852-45 Slide Adapter. Center neck can be used for mechanical stirring if needed. Stated capacity is WITHOUT horn.

**See Horn Selection Chart for proper horn size.**

Vessel NOT supplied with bushing or O-Ring, order separately.

Cap., mL	Ordering Code	Each		Ordering Code	Each
500	<b>9837-09</b>	128.82	#25 Nylon Bushing		
1000	<b>9837-14</b>	146.67	w/FETFE O-Ring, only	<b>7506-10</b>	13.37
2000	<b>9837-20</b>	185.22	#36 Nylon Bushing		
			w/FETFE O-Ring, only	<b>7506-12</b>	31.72



**9837**

**HORN SELECTION CHART FOR 9833, 9837 REACTION VESSELS**

Vessel Style	9833				9837			
	Capacity	250	500	1000	2000	500	1000	2000
<b>Horn/Extender Size</b>								
1/2" / 1/4" - 5	A	F	F	F	A	F	F	
1/2" / 1/2" - 5	A	F	F	F	A	F	F	
1/2" / 1/4" - 10	—	A	A	A	—	A	A	
1/2" / 1/2" - 10	—	A	A	A	—	A	A	
3/4" / 3/4" - 5	—	F	F	F	—	F	F	
1" / 1" - 5	—	F	F	F	—	F	F	

A—Horn is ADJUSTABLE, must be used with Slide Adapter

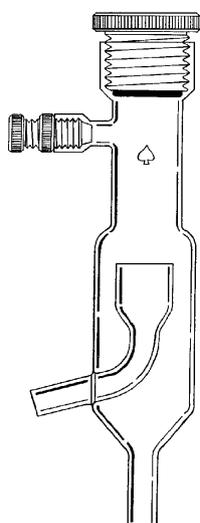
F—Horn used at FIXED length only

Horn/Extender—

First size is Horn diameter, second is Extender diameter and length, e.g., 1/2"/1/4"-5 is 1/2" horn (9814-25) with 1/4" microtip extender (9818-17) 5" long.

**Helpful Hints for Sonochemistry**

- As tip size decreases, intensity increases, at a given power setting.
- Almost all activity takes place immediately below the tip.
- Tips MUST be kept submerged during operation.
- Horns (probes) or extenders MUST be held ONLY at the node (nodal point).
- Tips 1/4" and smaller CANNOT be operated at full power output. Follow directions provided with power supply.
- Side of horn, extender or tip of probe should NEVER touch vessel walls.
- Most reactions work better when solution is kept cool.
- In many reactions the probe itself may provide enough turbulence and additional stirring usually is not necessary unless very viscous materials or heavy metal catalysts are used.
- For large volume reactions, consider multi-neck vessels since mechanical stirring might be necessary.
- Removable tips have been sometimes problematic as liquid may seep into gaps between probe and tip. Many sonochemists have no problem with this and find the economy of the removable tip important. However, it is important to remove, clean and polish the tip regularly to avoid cross-contamination and excessive wear.



9841

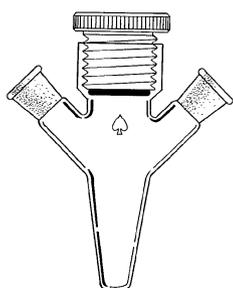
### 9841 FLO-THRU REACTOR, Sonochemical ♣

Continuous flow borosilicate glass reactor provides uniform treatment by forcing reactant to pass in front of horn tip. The degree of processing is controlled by varying the power level and flow rate, max. 1.5L/M. Reactants are pumped through side port, overflowing inner cup and out through bottom port. Treated material drains completely (no hang-up). Use of 9852-41 Slide Adapter in #25 Ace-Thred at top allows probe position to be varied within the inlet cup area, thereby maximizing use of ultrasonic energy.

Must be used with 1/2" (9814-24) Horn and either 1/2"-5 Extender (9816-06) or 1/4"-5 (9818-17) Microtip. Inlet and outlet tubes are 1/2" O.D. (13 mm). #7 Ace-Thred located below top thread is for bleed or vacuum connection. For latter use, bushing with hole needs to be ordered for tubulature connection. Operated in vertical position only.

Complete item consists of reactor, #7 PTFE plug and #25 Nylon bushing. Slide adapter and horn must be ordered separately.

	Ordering Code	Each
Reactor Body, only	9841-18	154.58
#7 PTFE Plug, only	5803-05	33.52
#25 Nylon Bushing w/FETFE O-Ring	7506-10	13.37
COMPLETE	9841-30	201.47



9843

### 9843 REACTION VESSEL, Sonochemical, Small Volume, 3-10 mL ♣

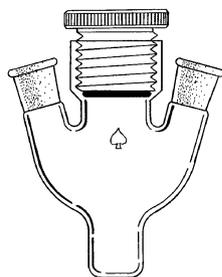
Tapered walls and proper size horn allow volumes as little as 3 mL to be reacted. Fabricated of borosilicate glass with #25 Ace-Thred center neck and two #14/20 side necks.

With 7506-10 Bushing, center neck will accept 9852-41 Slide Adapter with 9814 Horn and Extender (see chart below). Vessel measures 123 mm (4<sup>7</sup>/<sub>8</sub>") high. Not supplied with bushing.

	Ordering Code	Each
Reactor Vessel, only	9843-04	119.27
#25 Nylon Bushing w/FETFE O-Ring	7506-10	13.37
COMPLETE	9843-25	132.64

#### HORN SELECTION CHART FOR 9843

Type Connection	Horn/Extender—Length	Min. Op. Cap.
Adjustable	1/2" / 1/4"—5"	3 mL
Adjustable	1/2" / 1/2"—5"	6-10 mL



9844

### 9844 REACTION VESSEL, Sonochemical, Small Volume, 10-50 mL ♣

For small-scale reactions, 10 mL in bottom well and up to 50 mL in main body. With #25 Ace-Thred center neck and two #14/20 side necks.

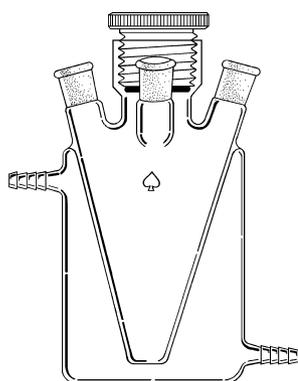
With 7506-10 Bushing, center neck will accept 9852-41 Slide Adapter with 9814 Horn and Extender (see chart below).

Vessel measures 120 mm (4<sup>3</sup>/<sub>4</sub>") high (including thread). Not supplied with bushing.

	Ordering Code	Each
Reactor Vessel, only	9844-07	138.11
#25 Nylon Bushing w/FETFE O-Ring	7506-10	13.37
COMPLETE	9844-19	151.48

#### HORN SELECTION CHART FOR 9844

Type Connection	Horn/Extender—Length
Adjustable	1/2" / 1/4"—5"
Adjustable	1/2" / 1/2"—5"



9848

### 9848 VESSEL, Reaction, Jacketed, Sonochemical ★

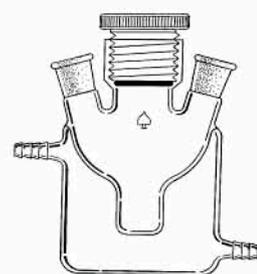
Similar to 9833-05 Vessel except jacketed to provide active cooling from tap water or mechanical cooler. Jacket is cylindrical with flat bottom for greater stability. With #25 Ace-Thred center neck and three #14/20 side necks. Use 7506-10 Bushing with O-Ring in center neck to secure 9852-41 Slide Adapter for connecting converter. Capacity 250 mL.

	Ordering Code	Each
Vessel, only	9848-07	★314.77
Bushing, Nylon, #25 w/ FETFE O-ring	7506-10	13.37
COMPLETE	9848-35	★328.14

**9850 VESSEL, Reaction, Jacketed, Sonochemical ★**

Similar to 9844-07 Vessel except jacketed to provide active cooling from tap water or mechanical cooler. Jacket is cylindrical with flat bottom for greater stability. With #25 Ace-Thred center neck and two 1/4" side necks. Use 7506-10 Bushing with O-Ring in center neck to secure 9852-41 Slide Adapter for connecting converter. Capacity 10-50mL.

	<b>Ordering Code</b>	Each
Vessel, only	<b>9850-12</b>	★310.78
Bushing, Nylon, #25 w/ FETFE O-ring	<b>7506-10</b>	13.37
COMPLETE	<b>9850-30</b>	★324.15

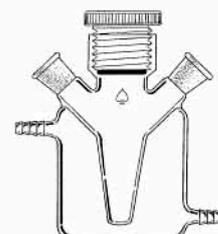


9850

**9851 VESSEL, Reaction, Jacketed, Sonochemical ★**

Similar to 9843-04 Vessel except jacketed to provide active cooling from tap water or mechanical cooler. Jacket is cylindrical with flat bottom for greater stability. With #25 Ace-Thred center neck and two 1/4" side necks. Use 7506-10 Bushing with O-Ring in center neck to secure 9852-41 Slide Adapter for connecting converter. Capacity 3-10mL.

	<b>Ordering Code</b>	Each
Vessel, only	<b>9851-05</b>	★282.02
Bushing, Nylon, #25 w/ FETFE O-ring	<b>7506-10</b>	13.37
COMPLETE	<b>9851-27</b>	★295.39



9851

**9852 ADAPTER, Slide, Sonochemical ▲**

For use with 1/2" Ultrasonic Horn, Cat. No. 9814-25, and 1/4" or 1/2" extenders, only. Both slide adapters have a #36 Ace-Thred at top with a 6" extension, either 25mm O.D. for insertion into a #25 Ace-Thred, or 35mm O.D. for use in a #36 Ace-Thred.

Secure 1/2" horn in adapter with 7506 Bushing and O-Ring, then slide adapter extension into thread on reaction vessel, again securing with 7506 Bushing. Now you have a variable depth adjustment of horn to achieve greater efficiency. Complete item consists of adapter, one Nylon bushing with one FETFE O-Ring.

Ace-Thred Size	Extender O.D., mm	Ordering Code	Glass Adapter	Ordering Code	Bushing w/O-Ring	Ordering Code	COMPLETE
36	25	<b>9852-21</b>	45.16	<b>7506-12</b>	31.72	<b>9852-41</b>	76.88
36	35	<b>9852-25</b>	45.16	<b>7506-12</b>	31.72	<b>9852-45</b>	76.88



9852

**9860 SOUND ABATEMENT CABINET, Sonochemical ★**

Although ultrasonic vibrations are above the human audible range, in ultrasonic processing, high pitched noise is produced from harmonics emanating from the vessel walls and the fluid surface. The sound abatement cabinet permits extended processing without discomfort by greatly reducing that noise.

Cabinet is fabricated from steel, painted chemically resistant blue, with clear plastic door. Inside of cabinet is lined with sound abating foam. One hole supplied at top for lead from power supply, two holes at bottom for water inlet/outlet, etc. All holes are covered with slit rubber. 1/2" vertical mounting rod located toward rear to left is for mounting sonochemical reactor.

Supplied with side handles for carrying and locking casters on bottom. Measures 46 1/2" high x 24" wide x 19" deep.

<b>Ordering Code</b>	Each
<b>9860-24</b>	★1031.47



9860

**ACCESSORIES**

*For Additional Items:*

- Pump — see 13268
- Support Stand — see 13586
- Clamps — see 11065, 11082, 11084
- Glass Adapters — see 5028, 5030, 5261