

User Reference Guide

OmniRuptor 250 Ultrasonic Homogenizer

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ABOUT THIS MANUAL



Congratulations on purchasing the OmniRuptor 250, the finest Ultrasonic Homogenizer on the market today.

The *OmniRuptor 250 Ultrasonic Homogenizer User Reference Guide* is a comprehensive manual that contains all the instructions you need to operate the instrument. To help you understand the functionality of the OmniRuptor 250 Ultrasonic Homogenizer efficiently, this manual is organized by tasks, beginning with unpacking the instrument, reviewing safety instructions to applying the instrument to specific applications.

Before you begin

Please read entire *OmniRuptor 250 User Reference Guide* and retain *OmniRuptor 250 User Reference Guide* for continued safe use of the instrument.

Icon Key

- ! Take note
-  Important information
-  Caution

SAFETY PRECAUTIONS

This User Reference Guide contains important safety and operating instructions for the OmniRuptor 250 Ultrasonic Homogenizer.

1. An extension cord should not be used unless absolutely necessary. Use of improper extension cord could result in a risk of fire and electrical shock. If extension cord must be used, make sure:
 - a. That pins on plug of extension cord are the same number, size, and shape as those of plug on OmniRuptor 250 Ultrasonic Homogenizer.
 - b. That extension cord is properly wired and in good electrical condition; and
 - c. That the wire size is large enough for the length of cord as specified below:

Length of cord in feet:	10	25	50
AWG size of cord:	20	18	18
2. Do not operate the OmniRuptor 250 Ultrasonic Homogenizer with a damage cord or plug. Replace the cord or plug immediately.
3. Do not operate the OmniRuptor 250 Ultrasonic Homogenizer if it has received a sharp blow, been dropped, or otherwise damaged in any way. Call our Customer Service Department for service or repair.
4. Do not disassemble the OmniRuptor 250 Ultrasonic Homogenizer. Only a qualified serviceman should service or repair instrument when required.
5. To reduce risk of electrical shock, unplug the OmniRuptor 250 Ultrasonic Homogenizer from outlet before attempting any maintenance or cleaning. Turning off controls will not reduce risk.

UNPACKING

Your instrument has been carefully packaged to ensure safe delivery of the OmniRuptor 250 Ultrasonic Homogenizer.

The following items are contained in the shipping carton:

- 1 Converter assembly.
- 2 Ultrasonic generator.
- 3 Power Cord.
- 4 Laboratory clamp holder and 3 prong clamp
- 5 ½" diameter stainless steel rod.
- 6 Thumb screw
- 7 Two (2) 2" diameter pin wrenches.
- 8 Five (5) plastic replacement washers.
- 9 User Reference Guide
- 10 Warranty registration card.

If any items are missing or damaged after a careful check, please notify Omni International's Customer Service Department immediately. If there is obvious shipping damage, promptly file a claim with the carrier.

SETUP

By following these four simple steps, you can begin operating your OmniRuptor 250 Ultrasonic Homogenizer almost immediately.

- ◆ Place the generator on a flat surface, using the same care as with any electronic device. Avoid placing generator near flammable vapors and water.
- ◆ Note the BNC convertor connector on the rear panel of the generator. Insert the convertor assembly's BNC connector into this BNC connector. The OmniRuptor 250 Ultrasonic Homogenizer will not operate unless the plug is in place.
- ◆ Connect the power cord to the power entry module located on the rear panel of the generator. Plug the power cord into a grounded outlet of 115 volts, 60 cycles, or 230 volts, 50 cycles, AC. Check the Serial Plate and power entry module on the rear panel for voltage requirements.



CONTROLS

The detailed description of the OmniRuptor 250 Ultrasonic Homogenizer are listed below. Refer to Figure 1 for location of controls.

On/Off Switch

The ON/OFF switch is located on the back panel of the generator. The switch is marked with the international symbols of ‘-’ for “ON” and ‘o’ for “OFF.”

Power Output LED Meter

The Power Output LED Meter indicates the percent of ultrasonic power being generated by the Titanium Tip.



- ◆ When using the Intermediate Titanium Tip, the ultrasonic power should not exceed 80%.



- ◆ When using the Micro Titanium Tip, the ultrasonic power should not exceed 50%.

Power LED

When the ON/OFF switch is turned “ON,” a Power LED on the front panel in the upper left hand corner will light to indicate that the instrument is on.

Timer LED

When the Timer control knob is set to a desired number of minutes, the Timer LED will light to indicate that the Timer is on.

Pulser LED

When the Pulser control knob is set to a desired duty cycle percentage, the Pulser LED will light to indicate that the Pulser is on.

Power Control Knob

Located on the lower left-hand side of the front panel. This allows the user to control the percent of full power delivered to the solution. Located in the upper control panel is the 10 segment LED power output meter reflecting this per cent. Turning the knob clockwise increases the percent of full power.



When operating the OmniRuptor 250 with the optional Micro Tip, catalog number OR-T-156, the Power Control Knob should not exceed 50%. Operating the Micro Tip above 50% can render the tip inoperable and/or cause the radiating face of the tip to pit, dramatically reducing the life of the tip.



When operating the OmniRuptor 250 with the optional Intermediate Tip, catalog number OR-T-375, the Power Control Knob should not exceed 80%. Operating the Intermediate Tip above 80% can render the tip inoperable and/or cause the radiating face of the tip to pit, dramatically reducing the life of the tip.

Pulser Control Knob

Located to the right of the Timer control knob. The Pulser knob allows for two different power output modes: a constant mode and a pulse mode. The pulse mode applies ultrasonic energy to the tip at a rate of one pulse per second. The pulse duration can be adjusted from 10% to 90%, enabling a solution to be processed at full power range while limiting temperature. The pulse mode is especially valuable for processing heat sensitive samples. The constant mode is operative when the knob is in the fully counter clockwise position.

Timer Control Knob

Located to the right of the Power control knob. The Timer is adjustable from 1 to 15 minutes. The timer is turned off when the knob is in the fully counter clockwise position.

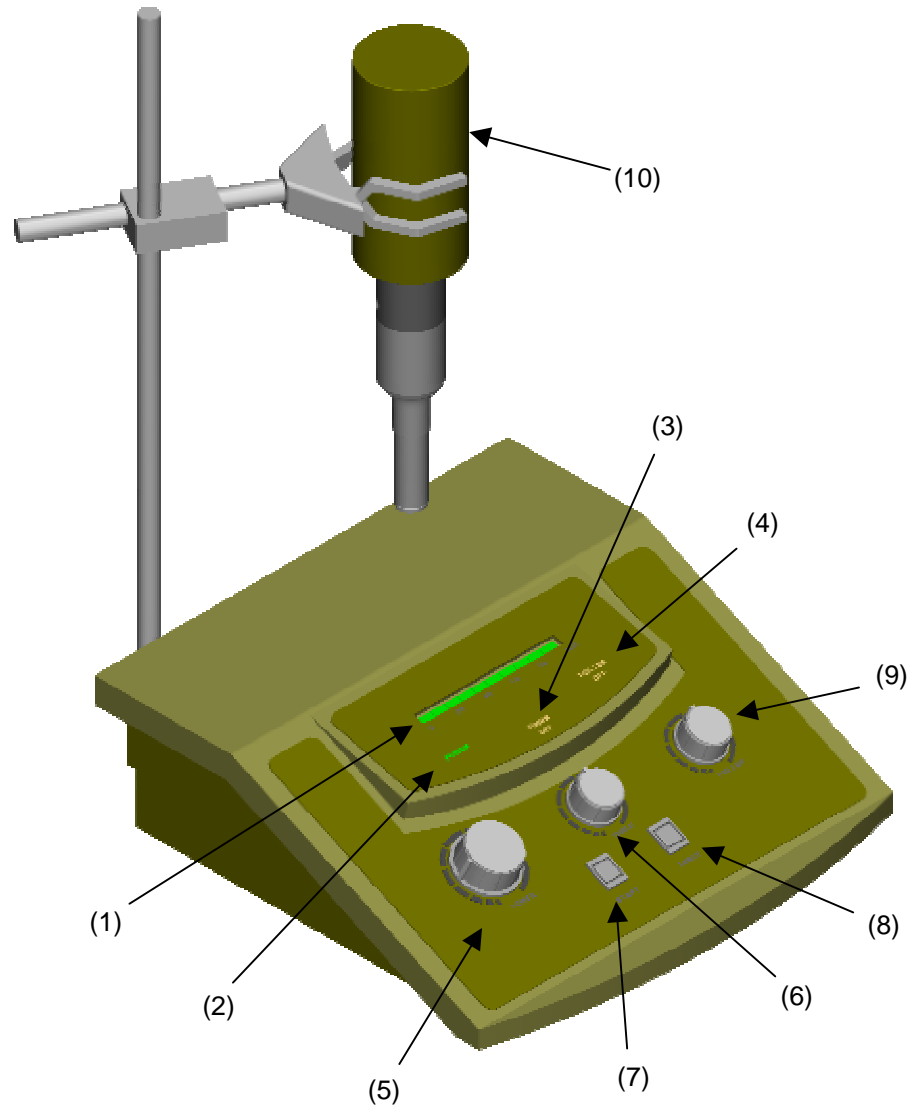
Start Button

Pressing “Start” begins the ultrasonic processing at the preset power lever, pulser, and time.

Reset Button

Pressing “Reset” interrupts the processing. When the instrument is turned on but is not engaged in processing, it is in the idle state.

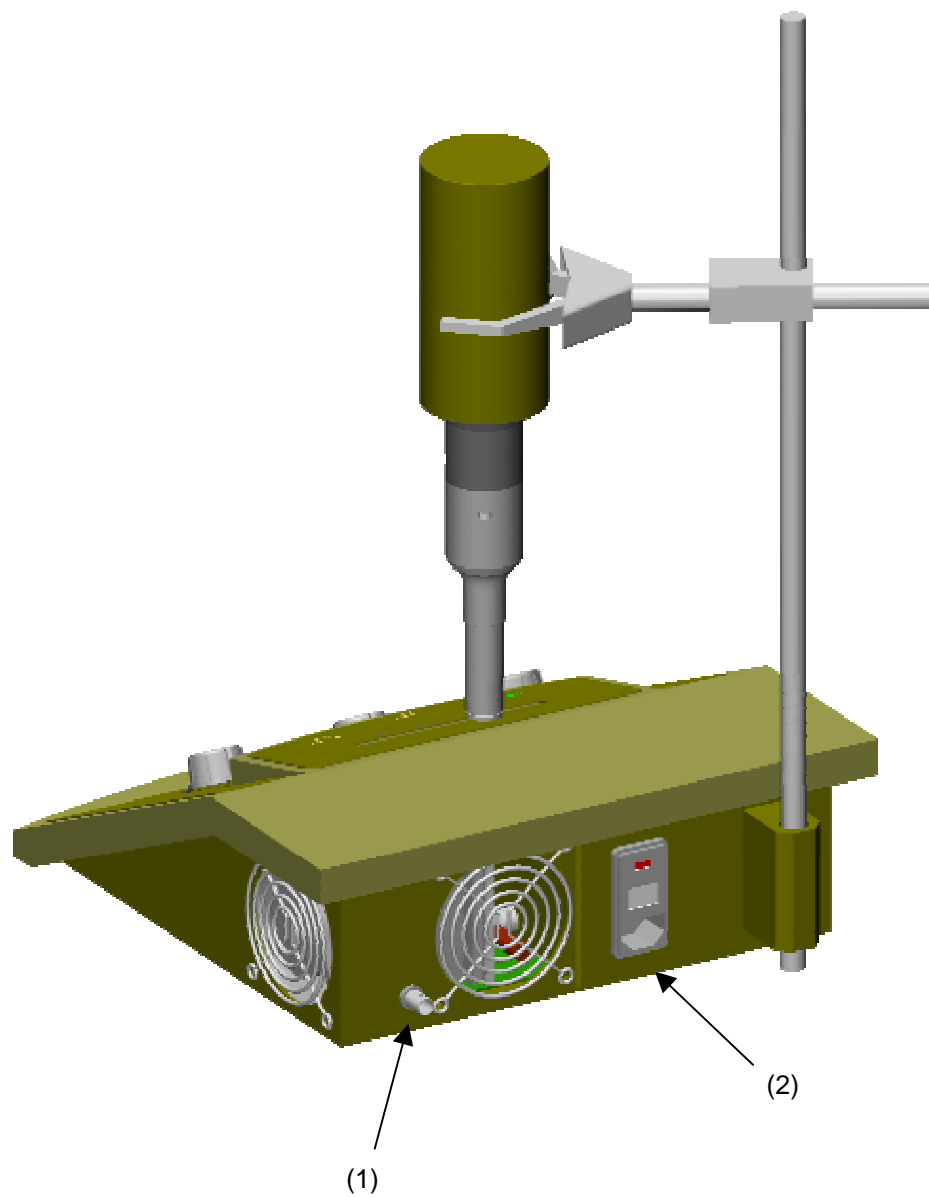
Figure 1



- (1) POWER OUTPUT METER
- (2) POWER LED
- (3) TIMER LED
- (4) PULSER LED
- (5) POWER CONTROL KNOB

- (6) TIMER CONTROL KNOB
- (7) START BUTTON
- (8) RESET BUTTON
- (9) PULSER CONTROL KNOB
- (10) CONVERTOR

Figure 2



(1) BNC CONVERTOR CONNECTOR

(2) POWER ENTRY MODULE

OPERATION

An understanding of the operation of each component of the OmniRuptor 250 Ultrasonic Homogenizer is important before applying the instrument to an application.

Generator



It is important to note that the OmniRuptor 250 Ultrasonic Homogenizer **SHOULD NOT BE OPERATED AT ITS MAXIMUM POWER LEVEL FOR MORE THAN FIFTEEN (15) MINUTES**. Long periods of operation will shorten the life of the electronic components due to the high temperature developed inside the unit. After operating the OmniRuptor 250 Ultrasonic Homogenizer for fifteen (15) minutes at the maximum power level, allow it to run for five (5) minutes in its idle state to cool the unit to approximately ambient temperature. When cycling the unit with large numbers of samples at maximum power level, observe the same precautions with respect to heat. Be sure to periodically allow the unit to cool down.

Convertor

The convertor assembly may be hand held or mounted in the support stand. To test the convertor, fill a small beaker half full of water. Switch the device on. The LED on the front panel will light up. Turn the Power Control Knob to a high range. Immerse the tip in the water approximately a centimeter. Push the Start button. Intense cavitation will occur in the water. No warm-up is required.



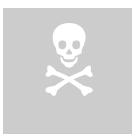
It is important to note that the convertor and tip will get hot after long periods of operation.

Ready To Use

After the initial testing of the instrument, push the “Reset” button. Set the desired Power Level, Pulser, and Timer. Immerse the tip in the appropriate solution. Push the “Start” button to deliver the ultrasonic power to the convertor. If the Timer is used, the processing will automatically stop when the Timer is through. Push the “Reset” button to terminate the processing at any time.

GENERAL INFORMATION

The information listed below may be useful in determining whether the OmniRuptor 250 Ultrasonic Homogenizer is applicable to your task.



1. Extreme caution must be exercised when employing toxic materials such as carbon tetrachloride, that can decompose to harmful gases.



Ultrasonic Homogenizers use sound waves to agitate mixtures. This can cause rapid heating and localized points of increased pressure. They should **NOT** be used with sealed flasks or with flammable liquids, especially low-boiling solvents (such as ether).



2. Do not hold the titanium tip while the convertor is on.



3. The frequency of the ultrasonic output is 20 kilocycles per second.

4. The tip is fabricated from titanium. After extended use, the tip will erode due to intense cavitation. A slightly frosted appearance will occur on the face of the tip as erosion proceeds. Eventually, advanced erosion will cause undue scattering of ultrasonic energy. An experienced machinist can refinish the tip. In refinishing the tip, no more than 1/32" should be removed. Removal exceeding this value will drastically alter the resonant frequency of the transducer and reduce system efficiency.

5. To remove the tip, place the wrenches in each of the holes near the wider part of the convertor, opposing the wrenches and placing them in a position to gain a counter clockwise leverage on the tip. The tip can then be removed by rotating it counter clockwise. When installing the tip or installing accessory tips, be sure the tip is fully tightened in place. Be sure to inspect both interfacing surfaces for nicks and debris. The slightest amount of debris will severely decrease efficiency. Always use a new, clean plastic washer when changing tips.

6. Ultrasonic produces heat from two major sources:



a. Transducer heating: This type of heat production is a problem with inefficient transducers. Heat is transmitted down the tip and into the treated material. With 93% transducer efficiency, little or no heat arises from this source.

b. Cavitation heating: When cavitation bubbles collapse, there is an intense, minutely localized heating. The amount of heat introduced into the treated material through cavitation is proportional to the amount of ultrasonic energy at the tip. In many cases it is important to minimize the heat. The Pulser control knob serves this purpose.

7. The OmniRuptor 250 Ultrasonic Homogenizer has a fully automatic feedback tuning system to maintain maximum efficient ultrasonic action regardless of load change.



8. When a liquid is subjected to ultrasonic energy at or above the threshold of cavitation, audible sounds are emitted from the vessel containing the liquid. These sounds can be irritating to the operator and care should be taken to avoid prolonged exposure. When the transducer is in the unloaded state (the tip removed from the substance), it will emit inaudible sounds. Although the relative impedance of air to metal is great, it is estimated that approximately 10% of the inaudible sound will be transmitted through the air. Some individuals are sensitive to these inaudible sounds which can become irritating. Care should be taken to avoid continuous exposure to both audible and inaudible sounds. It is recommended to use Omni's SOUNDCONTROL enclosure which reduces the noise level by 40 decibels.

9. The convertor assemblies are interchangeable from one Ultrasonic Homogenizer generator to another. Tips are also interchangeable.

ACCESSORIES

There are several Tips and accessories available to fit your applications. The detailed description of each Tip and accessory should aid in making a selection.

SOUNDCONTROL CHAMBER

Catalog No. OR-A-01

This enclosure is used to decrease both audible and inaudible sound level by forty decibels. For safety reasons, the use of this enclosure is recommended, especially where there is prolonged operator exposure.

Titanium Micro Tip 5/32" Diameter (3.9 mm)

Catalog No. OR-T-156

This tip comes in two parts, an aluminum rear section and a titanium front section. The titanium tip measures 0.156" in diameter at the radiating surface. The μ Tip is designed to provide the same power density level per square inch over the 0.156" as is available in the standard tip, therefore the same disruptive effect is achieved, but it is confined to a smaller area. **CAUTION:** Note the recommended maximum power designations for the μ Tip on the front panel. If the μ Tip is overdriven at a too high a power level, it will break due to metal fatigue. When installing the μ Tip, be sure to examine both interfacing surfaces for nicks or debris and always use a new, clean plastic washer.

Titanium Intermediate Tip 3/8" Diameter (9.5 mm)

Catalog No. OR-T-375

This tip consists of two parts, an aluminum rear section and a 3/8" diameter titanium nose section measuring approximate 5" long. The assembly is designed to provide the same power density level at the radiating phase as is available in the standard tip. When using this tip, observe the recommended maximum power designations for the intermediate tip on the front panel of the generator. When installing, always inspect mating surfaces and use a new, clean plastic washer.

Titanium Standard Tip 3/4" Diameter (19 mm)

Catalog No. OR-T-750

The standard tip is included with the OmniRuptor 250 Ultrasonic Homogenizer. When pitting in the face of the original tip reaches a depth of approximately 1/32", it is recommended the tip be replaced or refinished. This occurs after twelve to twenty four hours of cumulative running time at maximum intensity. The extent of erosion will depend on the composition of the liquid to which the tip is exposed.

Titanium Cup Tip 50 ml

Catalog No. OR-C-050

The 50 ml cup tip consists of a solid titanium rod of 2" diameter with a 50 ml cavity machined into one end. A cover is supplied with the tip. The cup tip acts as a small-batch, closed system. To install, replace the standard tip with the cup tip. Slide the rubber skirt half-way down the length of the tip. Invert the convertor assembly so as to have the cup tip in a position to hold liquids. The skirt helps prevent liquids from spilling into the transducer housing. When installing the cup tip, be sure to inspect both mating surfaces and always use a new, clean, plastic washer. There are no power restrictions when using the cup tip.

Cooling Jacket For Use With 50 ml Cup Tip

Catalog No. OR-C-050-C

The cooling jacket fits around the cup tip chamber and is held in place by built-in O-rings. It has an inlet and an outlet for circulating a coolant for the outer wall of the cup tip. To install, fit over the cup tip and slide into place until both O rings have made a seal. Before installation, lubricate O rings with a small amount of silicone grease.

Continuous Flow Chamber

Catalog No. OR-F-01

The continuous flow chamber allows for continuing mixing. There are three ports provided for introducing materials into and withdrawing them from high intensity ultrasonic on a continuous basis. A cooling jacket is provided to maintain chamber temperature.

Interface Washers (Small - for Micro Tip)

Catalog No. OR-A-W156

These plastic washers measure 1-1/2" diameter and are to be used in conjunction with the Micro tip only (package of 5).

Interface Washers (Large - for all other Tips)

Catalog No. OR-A-W

These plastic washers measure 2" diameter and are to be used in conjunction with the Intermediate tip, Standard tip, and Cup tip (package of 5).

1-1/2" Diameter Convertor Pin Wrench

Catalog No. OR-A-T156

Use this wrench to attach and remove the Micro Tip from the convertor.

2" Diameter Convertor Pin Wrench

Catalog No. OR-A-T

Use this wrench to attach and remove all other Tips from the convertor.

APPLICATIONS

Listed below are just a few applications the OmniRuptor 250 Ultrasonic Homogenizer is capable of accomplishing.

Acetobacter suboxydans - complete disruption in a few seconds

Actinomyces - 3 minute sonicating produced excellent disruption with 50% protein released and excellent enzyme activity

Actinomycin D - suspended or dissolved in 3 minutes

Aerobacter aerogenes - excellent breakage with better enzyme release than any other method. A low power setting can release sulfatase activity into the supernate with no obvious disruption of the majority of cells.

Algae scenedesmus - 10 ml concentrated solution completely disrupts in 1 minute

Alkaloids - total amount as well as speed of extraction is greater using the OmniRuptor 250 Ultrasonic Homogenizer than with standard methods. Extraction from ipecac root in 30 seconds yielded more alkaloid than Soxhlet extraction in 5 hours.

Antibioticus - monocellular elements from surface-grown colonies attained in 1 minute 50% disruption in 2 minutes. Complete disruption in 5 minutes.

Antigen - the OmniRuptor 250 Ultrasonic Homogenizer is extensively used to produce antigens and vaccines, either to increase yield or expose otherwise unobtainable sites.

Antigen/antibody complexes - these complexes can be broken apart.

Aorta - 1 gram disintegrates in 2 minutes.

Aphanomyces - after blending, complete disruption in 3 minutes.

Arthrobacter tumescans - 10 gm in 40 ml disrupted in 5 minutes for 0 coumaric reductose.

Ascaris eggs - concentrated solution, 8 ml, complete breakage in 3 1/2 minutes.

Aspergillus - complete disruption in 4 minutes.

Aurefaciens - monocellular elements from surface-grown colonies obtained in 1 minute. 50% disruption in 2 minutes. Complete disruption in 5 minutes.

Azotobacter Vinelandii - 15 ml buffered solution, 200 mg wet wt. per ml, complete disruption in 2 minutes.

Bacillus - *Stereothermophilus* (Thermophillic spore form) 98% disruption in 15 minutes of 70ml of 40% suspension.

Bacteroides symbiosis - 1 phosphofructokinase a soluble enzyme has been isolated from this anaerobe by ultrasonic treatment. A 25 ml suspension was sonicated for 10 minutes and centrifuged at 36,000 xg for 10 minutes.

B. anthracis - 80% disruption in 4 minutes *Erysipelothrix rhusipathiae*, 10ml complete disruption in 10 minutes.

B. cereus veg cells - disruption in a few seconds

B. cereus spores - disruption of 6 ml, 13 minutes.

B. megaterium spores - concentrated 6 ml solution, 15 minutes for complete breakage.

B. stereothermophilis spores - complete disruption in 2 minutes.

B. subtilis - disruption of 5 gm wet wt., 15 ml buffer, in 5 minutes.

B. subtilis veg cells - heavy suspension clears in 1 minute.

Baker's yeast (*saccharomyces cerevisiae*) - 9 grams pressed yeast in 18 ml buffer, complete disruption in 8 minutes. Protein release, 52 mg/ml from an aged sample.

Blastomyces dermatitidis - 95% disruption in 3 minutes.

Blood cells - red and white cells can be disrupted in a few seconds.

Boll weevil tissue - complete homogenization in a few seconds.

Bone - compact bone can be sonicated and processed for microscopic sections in minutes as opposed to several days or even a week by other methods. Bone specimens treated in this way yielded large numbers of intact cells with little distortion. Malignant criteria were easily recognized. Tumor types studied were osteosarcoma, chondrosarcoma, liposarcoma, chordoma, metastatic bronchogenic squamous and benign giant. Bone

can be decalcified without injury to the cells in a short time, processed for microscopic sections, and diagnosed. Other methods require extensive treatment time.

Brain stem and adrenal gland - sonicating dispersed 10 mg samples in 10 ml fluid, normally difficult without substantial loss of material. Suspension analyzed for nucleotides.

Brain tissue - complete disruption instantly.

Brevi bacterium - 25 ml disrupts in 20 seconds.

Brevi bacterium acetylicum - approximately 3 minutes to disrupt large samples and measure TCA enzyme activity.

Brine Shrimp - complete disruption in 1 minute.

Brucella abortes - separates easily from leukocytes. At least 9 antigens extracted.

Bull sperm - contractile protein more easily extractable from tails after sonicating.

C. butyricum - vegetative cells easily disrupted.

C. cylindrosporum - vegetative cells easily disrupted.

C. Kluyveri - vegetative cells easily disrupted.

C. pasteurianum - 3 minute disruption for hydrogens reducing Ferredoxin with H₂.

Calcium - mouse Ehrlich ascites tumor cells were sonicated for 1 minute to determine the amount of bound calcium present. Cells were labeled with calcium 45.

Candida albicans spores - 95% disruption in 35 minutes 15ml solution, 1/2 gm dry wt.

Carbon black - excellent small particle suspension and deagglomeration.

Caryophanon latum - sonication yields glucosamine, muramin acid, alanine, glutamin acid and lysine.

Catecholamine - can be extracted from heart muscle through sonication.

Cellomonas biazotea - disruption obtained with retention of malate dehydrogenase activity.

Chemical (and physical) reactions - accelerated by sonication, as are enzymatic processes.

Chicken sperm - 30 ml complete disruption in 2 minutes.

Chlorella - 10 ml complete disruption in 3 minutes

Chloroplasts - disrupt in a few seconds.

Cholesterol - apparent permanent suspension in 1 minute in water.

Chromatography - prior ultrasonic treatment of absorbent in any convenient solvent for a few seconds eliminates aggregates and results in a uniform, easily packed column.

Clostridium - quickly disrupts all types.

Coagulase-globulin - sonicating before precipitation yields much more enzymes.

Collagen - an excellent fragmentation.

Colletotrichum capsici spores - 5 ml with 6 million spores/ml, complete disruption in 4 minutes.

Corticosteroid - particle size can be reduced to approximately 5 mic. Large volumes can be treated at the rate of approximately 30ml/min on a continuous flow basis.

Corynebacterium - complete disruption in 4 minutes with 50% protein release and excellent enzyme activity.

Cryptococcus laurentii - complete disruption in 7 minutes with good protein release and enzyme activity.

Cryptostroma corticale (maple bark spores) - concentrated 6 cc solution, complete disruption 14 minutes.

Crystal reduction - large crystals of an organic compound suspended in isopropanol can be reduced in diameter by 10 to 40%.

Cyanidium caldarium - concentrated 5 ml solution disrupts in 6 minutes.

Decalcify - bone may be decalcified without injury to the cells, processed for microscopic sections, and diagnosed in a short time - as opposed to several days or even a week by other methods.

Dental plaques - 5 ml solution, concentration 1 to 10,000, low power setting, 53,500,000 organisms per ml were obtained in 45 seconds.

Desulfovibrio vulgaris - less than 30 seconds of sonicating resulted in release of TCA enzymes.

Diplococcus - complete disruption in 5 minutes.

DNA - breaks chain on low power instantly. Controlled degradation may be obtained.

Dyes - excellent rapid dispersion and homogenization.

E. coli - 2 gm wet wt in 10 ml solution, complete disruption 40 seconds. The OmniRuptor 250 Ultrasonic Homogenizer has been used extensively in research on this organism.

Egg whites - can be reduced to homogeneous, pipettable solution in 15 seconds on low power.

Ehrlich ascites - disrupt in a few seconds.

Electron microscopy - apertures are quickly cleaned.

Embryonic duodenum - a 1 ml sample is easily homogenized in 15 seconds with a special μ Tip.

Emulsions - 10 ml of most light mixtures become semi-permanent emulsions in about 1 minute without emulsifiers; average particle size is usually well under 1 micron. Sterile emulsions can be prepared by ultrasonic treatment for feeding to germ-free animals.

Enterococcus - excellent disruption

Erwina cartovara - complete disruption in 1-2 minutes depending on cell concentration.

Erythrocytes - easily disrupted in a few seconds.

Euglena gracilis - complete disruption in a few seconds to isolate chloroplasts.

Eugoena - 90% disruption in 8 minutes with pigment released. Complete disruption in 12 minutes.

Extraction - excellent for oils, fats and lipids, alkaloids.

Fasciola hepatica - complete disruption in less than 1 minute.

Fat extraction - fat may be emulsified without injuring tissue with proper power selection. Lipid layer can be stripped from spores and mycobacteria.

Fibrin - complete suspension 1/8 gm in 30 minutes.

Fish gill - complete disruption of 20mg in 30 seconds.

Fish tissue - tissue homogenization for extractions, excellent particle size reduction, 8 minutes per 10gm.

Fluorocarbons - extended treatment time will break down particle size to well under 1 micron and gives a fine homogenate.

Fossils - low power will clean debris from delicate fossils without injury. Micro fossils such as pollen can be separated from rocks to help identify the geological age of the strata. Removal of rock matrix.

Fuel oil and water - permanent emulsions without wetting agents can be formed on continuous flow basis.

Gamma globulin - the OmniRuptor 250 Ultrasonic Homogenizer was used to solubilize protein as one of the steps in the biosynthesis of gamma globulin from rabbit spleen.

Gangliosides - immunochemical and structure studies were aided by an ultrasonic treatment as one step during the procedure.

Gastric mucosa - placing scrapings into a test tube and test tube into OmniRuptor 250 specially designed Cup Tip permits these cells to be separated and not broken.

Germ free - sonication is a good method for preparing sterile emulsions fed to germ free animals.

Graphite molybdenum disulfide - an excellent dispersion of this lubricant was made in silicate binder.

Guanine - produces colloidal suspension in 1 minute

Gymnodinium - 10 ml solution completely disrupts in 6 minutes.

Heart muscle - 1 gm disrupts in 6 minutes.

HeLa cells - disruption to free virus in a few seconds without injury.

Hemophilus pertussis - an immunological compound prepared.

Herpes virus - may be quickly released without injury.

Histoplasma capsulatum - sonicating for 7 minutes completely ruptured cells prepared by formalin fixation. Good enzyme activity was obtained.

Human serum proteins - sonication causes a reproducible change in the electrophoretic behavior of normal human serum consisting of an increase in material

migrating in the v and b globulin zones with a reduction in the albumin and y globulin fractions.

Hydrocortisone - smaller crystals were produced by sonication.

Hydrophilic vegetable gums - disperses and solubilizes hydrophilic vegetable gums in water; makes dispersions of added particulate matter.

Intracellular membrane - disruption and particle size reduction obtained in 30-60 seconds.

Isoenzymes - are selectively activated with respect to time and intensity of treatment.

Kidney - 1 gm disrupts in 3 minutes.

Kidney stones - easily broken in seconds in vitro.

Klebsiella - excellent disruption.

Lactobacillus - 0.5 gm in 15 ml, complete disruption in 11 minutes. Excellent release of acetokinase.

L. arabinosis - complete disruption to free virus in 2 minutes without injury.

Leuconostoc mesenteriodes - ultrasonic treatment in 15 minutes using high power fir disruption. Leukocyte lysozme activity in myelocytic leukemia - the cell suspension was sonicated and samples assayed for lysozyme activity. The lysozyme concentration of the leukocytes ug./10 cells were determined.

Linoleic acid - made suspension in water in 30 seconds.

Liped vesicles - excellent results preparing small, unilamellar phospholipid vesicles with Cup Tip attachment, as well as by direct tip sonication.

Liver tissue - 1 gm homogenizes in less than 1 minute.

Lung tissue - 1 gm homogenizes in 2 minutes.

Lymphacytis - complete disruption in 15 seconds.

Lymphocyte nuclei - complete disruption in 6 minutes.

Lymphography - direct injection lymphography with a modified radiopaque emulsion was obtained by sonication in a functional procedure producing lymphatic structure detail.

Lysosomes - released enzymes quickly.

Malaria protozoa - excellent disruption quickly.

Maple bark spores - complete disruption in 14 minutes.

Measles - disruption of virus (measles) antigen clumps present in infected cells on low power. Sonication increased antigen titer 4-8 fold.

Methanobacillus omelianskii - complete disruption for assaying methane. 1 gm cells wet wt/ml of 0.5M, in 2 minutes.

Microbacterium lacticum - ultrasonic treatment used for malate dehydrogenase extraction.

Micrococci - complete disruption in 15 minutes, 13 ml solution.

Micrococcus lactiliticus - 75 ml of a 20% suspension was disrupted in 15 minutes. A good yield of the enzyme Xanthine dehydrogenase was extracted.

Mineral rock - excellent for cleaning surfaces between polishing stages.

Mitochondria - separates from cells without injury. Mitochondria themselves can be broken with longer sonication. Inner membrane sub units also isolated.

Muscle tissue - 1 gm homogenized in 4 minutes.; heart muscle 6 minutes.

Mycobacteria - 20 ml growing media completely disrupts in 14 minutes. Breaks clumps quickly. An immunological compound prepared.

Mycoplasma antibody - a suspension of Campo-W cells treated for 5 minutes gave 12 lines with the sera in a gel diffusion test. The extract was estimated to contain 12.75 mg protein per ml by Blaret reaction.

Myeloma tumor cells - Complete disruption in 10 minutes. 30% disruption in 2 minutes.

Myleran - made colloidal suspension and dissolved in approximately 1 minute.

Naegleri gruberi - this free-living soil ameba was sonicated to release subcellular infectious material.

N. crassa - nuclease was isolated and purified from conidial extracts after 5 minute treatment.

Neurospora - 40 ml, 4 minute produces more protein than freeze thawing for study of enzymatic synthesis of cystathionine.

Nocardia Ostenodes - breaks clumps and disrupts in less than 10 minutes.

Nucleoprotein - extracted from tissue. May be degraded selectively.

Oil and water emulsions - permanent, stable emulsions in a few seconds. Particle size reduced to less than 1/2 micron (each case slightly different). Oil in water-water in oil phases can be obtained in same vessel. Continuous flow process is available.

Oyster shell - small clean hole can be drilled with μ Tip in 3 minutes. No cracking is produced.

Paracolon - excellent disruption.

Parasites - easily separated from red cells in a few seconds.

Pasteurella pestis - complete disruption in 30 minutes of 20 ml using high power.

Penicillium - complete disruption in 3 minutes.

Pesticides - ultrasonic treatment resulted in a 16 fold improvement in the potency of the antigen used with Microcrystalline cellulose as a thin-layer absorbent for chromatographic separation.

Phosphatidate phosphohydrolase - the most potent inhibitors for this enzyme were obtained by making five dispersions with the OmniRuptor 250 Ultrasonic Homogenizer.

Phospholipid micelles - produced stable preparations for an indefinite period.

Plant cells - 30% packed plant cells (W/V) and distilled water (depending on type) can be completely disrupted in 1-15 minutes.

Platelets - complete disruption according to size from 20 seconds to 4 minutes.

Pneumococci - preserved in formalin for several years; complete disruption in 6 minutes.

Polio virus - excellent disruption of this most difficult virus.

Powders - are broken down to a small, relatively uniform particle size.

PPLO - complete disruption in 2 minutes.

Propionobacteria - releases sulfhydryl groups intact 70 ml of 20% suspension processed in 10 minutes.

Propionibacterium Shermanii - 2 minutes for extraction of citrate synthases.

Proteus - excellent disruption.

Pseudomonas aeruginosa - rapid, complete disruption.

Pseudomonas fluorescens - 2 gm wet wt in 10 ml, complete disruption in 1 minute.

Pulmonary cytodagnosis - the mucus in sputum can be evenly dispersed affording a quick representative sample of cells of cytologic examination. Cells are liberated from the mucus of sputum that has been immersed in 50% alcohol or fixative.

Ragweed pollen - 15 ml solution completely disrupts in 11 minutes.

Rat bone - 1/2 gm disrupts in 4 minutes.

Rat liver - complete disruption in 3 minutes.

Rat liver mitochondria - ultrasonic treatment has been used extensively for the varied research performed on this material. Disruption time is a matter of seconds.

Rat skin - complete disruption 1 gm in 4 minutes.

Red cell - sonicating breaks particle size to 100 Angstroms. Complete disruption in 1 minute. 25 gms/100ml, saline or plasma, sample treated 15 seconds, 35% disruption. Adenosine triphosphate was shown to be membrane bound by this method.

Reovirus - dissociates cell-bound and aggregated virus. Maximum titer with 4 ml of virus was achieved in 2 minutes.

Retinal outer segments - sonicating breaks particles down to almost molecular size.

Rhodopseudomonis palustris - complete disruption in 4 minutes.

Rhodospirillum rubrum - excellent disruption in a few seconds.

Rimosus - monocellular elements from surface-grown colonies obtained in 1 minute. Complete disruption in 5 minutes. 50% disruption in 2 minutes.

RNA - rapid and thorough re-suspension of 9 PCA pellets during extractions.

Rocks - excellent for desegregation of sedimentary rock. Excellent for cleaning material rock surfaces between polishing stages.

Saccharomyces cerevisiae (Baker's yeast) - 9 gm pressed yeast in 18 ml buffer; complete disruption in 8 minutes. Protein release 52 mg/ml from an aged sample.

Saliva glands - complete disruption.

Salmonella - various culture media or phosphate buffered saline disintegrated between 40 and 50% in 10-20 minutes. Sonicating was one step in an improved assay for enzyme thiogalactoside transacetylase.

Salmonella typhimurium and enteritidis - bacteria were suspended in 1/300 volume of original culture, sonicated for 4 minutes and centrifuged for 20 minutes at 20,000 g. Extracts were to catalyze the synthesis of cytidine diphosphate 3, 6-dideoxyhexoses.

Schistosoma mansoni - complete disruption.

Sedimentary rock - completely disperses flocs with the release of all bound silt and clay particles.

Sediments - Sonicating readily disperses fine material allowing a quick, neat separation of the sand from silt and clay fractions.

Serial number restoration - used in crime laboratories to restore obliterated serial numbers.

Serratia marcescens - complete breakdown in 1 minute for a 12 ml concentrated solution.

Serum - quickly homogenized.

Serum cholinesterase - activated by ultrasonic treatment. Different cholinesterase isoenzymes may be activated selectively and inactivated selectively.

S. faecalis - excellent disruption in 1 minute.

S. fragilis - 5 minute yielded excellent release of galactokinase; much more than any other methods. Sub cellular particles may be extracted or disrupted.

Shale - excellent desegregation of all fine grained sedimentary rocks.

Shellfish - by drilling a clean hole with the μ Tip, various fluids or samples may be withdrawn or injected from living shellfish without destroying the animal.

Shigella - quick disruption.

Skin - 1 gm disrupts in about 4 minutes. Epidermal homogenates can be extracted that are able to respire and utilize substrate. suspension.

Soil - separates solid particles without the use of oxidants, acids or peptizing agents and yields stable

Sperm (human) - tails are broken instantly, heads are broken in 20 minutes.

Sputum - Cancer cells are more easily detected after ultrasonic treatment due to even dispersion of cells and sputum, and complete liberation of the cells from sputum.

Staphylococcus - concentrated solution, 15 ml, 98% disruption in 10 minutes. With 1 gm cells wet wt, to 2 gm water, 54.5 mg/ml of protein was released.

Starch - obtained by extracting from green plant leaf homogenate.

Streptococcus, Group A - 20% suspension in 15 ml solution completely disrupts in 15 minutes.

Streptomyces - monocellular elements from surface-grown colonies obtained in 1 minute. 50% disruption in 2 minutes. Complete disruption in 5 minutes.

Sub cellular particles - may be separated or broken depending upon power selection and length of time.

Sulfanilamide - excellent dispersion in less than 1 minute. Continued sonication will produce complete disruption.

Sulfapyridine - excellent dispersion in less than 1 minute. Continued sonication will produce complete disruption.

Synovial fluid - sonicating is an excellent means of reducing fluid viscosity. The ultrasonic method is both simpler and faster than using hyaluronidase.

Tablets - complete disruption in 2-40 seconds depending on type. Excellent for automatic machines.

Tea - excellent extraction.

Tetrahymena - disrupts in a few seconds. Enzymes which have been monitored include: succinate, lactate, B-hydroxy butyrate, glutamate and DPNH oxidase, DPNH-cytochromeC reductase and ribonuclease. Specific activity of DPNH oxidase was twice that of the best previous experiments.

Thermoactinomyces - disruption of hyphae. Homogenization of protein complex without denaturation.

Thermophile negative - good disruption with in 2 minutes.

Thermophilic bacillus - Isocitrate lyase was extracted from a spore forming bacillus similar to Stearothermophilus. A washed cell paste suspended in phosphate buffer was sonicated in 1-2 minutes and the supernatant was used for enzyme experiments without further treatment. Extracts could be frozen and stored without loss of activity.

Thiouric acid - dissolved in a few seconds.

Thymus cells - complete disruption in 15 seconds

Tissue cultue cells - complete disruption in a few seconds. To avoid damage to free organelles and to obtain intact lysosomes, use low power at short exposure.

Toxin and antitoxin - one example of many: Toxin preparations of whole cell lystae (WCL) of the Inaba serotype strain 569E of the classic biotype of cholera vibrio were grown on 3% Bacto peptane agar and harvested in distilled water at 18 hours.

Toxoplasma gondii - can be separated from white blood cells without injuring.

T. pyriformis - excellent disruption; 8 enzymes released.

Transplantation antigens - were extracted from spleen, thymus and lymph nodes.

Trichomonas foetus - complete disruption in a few seconds.

Triolein - complete stable emulsion in 2 minutes.

Trypanosomes - concentrated 10 ml solution; complete disruption in 4 minutes.

Tumor tissue - disintegrates much faster than normal tissue.

Uterus muscle - 1/5 gm, 3 cc solution; complete disruption in 4 minutes for coenzyme Q determination.

Vaccines - numerous advantages such as more antigenic material released than usual and the producing of vaccines not obtainable by classical methods.

Variuos bacilli - complete disruption in 3 minutes.

Vibrio comma - excellent disruption.

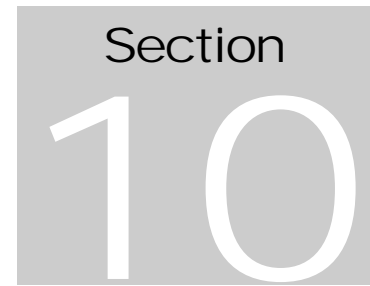
Virus extraction - excellent for making experimental vaccines. Evidence of breakage of virus/antibody bonds. Virus can be extracted at low power without damage, or broken at high power.

Vitamin E - 30 second sonication put material in solution with a resultant permanent suspension.

W138 Virus - Cell free V-2 virus obtained in 30 seconds using 6 ml of Veronal buffer with W138 cells containing V-2 virus.

Yeast - 3 to 10 minutes for complete disruption depending on type.

Zooplankton - disrupted in less than 1 minute.

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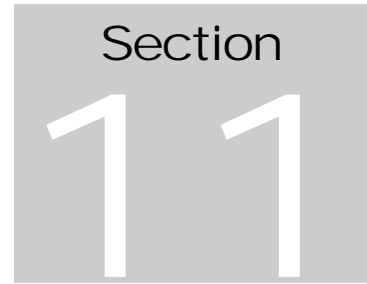
SERVICE

High voltages exist in the generator, and adjustments should only be made by trained electronic technicians.

In the event that the OmniRuptor 250 Ultrasonic Homogenizer does not function, the following tests should be made:

1. Be certain that the generator is plugged into a functional electrical outlet.
2. Be certain that the convertor assembly is plugged into the generator.
3. Be certain that the mating surfaces of the tip and convertor front section are free of debris and nicks. A new, clean plastic washer should be in place and tightly secured.
4. Check the fuse located in the rear of the generator.

If these steps do not result in satisfactory operation, contact Omni's Customer Service Department immediately.



SPECIFICATIONS

Features

Power Output	Variable 0 to 150 watts
Output Frequency	20 kHz
Automatic Tuning	Yes
Duty Cycle	Variable 0 to 90 percent
Timer	Variable 1 to 15 minutes
Display Type	LED Power Output Meter

Operating Range Temperature	0 to 40 Degrees Centigrade
Humidity	28 to 80 percent
Power Consumption	350 watts

Dimensions

Generator	12.5" (W) x 12.5" (D) x 4.5" (H) 317.5 mm (W) x 317.5 mm (D) x 114.3 mm (H)
Converter (only)	5" (H) x 3.5" Diameter 127mm (H) x 88.9 mm Diameter

WARRANTY

In order to validate this warranty, the registration card must be filled out and returned within ten (10) days after receipt of the OmniRuptor 250 Ultrasonic Homogenizer.

The OmniRuptor 250 is warranted to the Buyer to be free of defects caused by faulty materials of workmanship as follows: defective parts and materials will be replaced, or at the election of Omni International, repaired at no charge for a period of one (1) year from the date of sale, and the labor required for such replacement or repair will be provided by Omni International at no charge for a period of six (6) months from the date of sale. Omni International's liability under this warranty is restricted to replacing, repairing, or issuing credit (at Omni International's option) for any Omni International product found to be defective within the warranty period stated above. Defective products shall be returned to the place of manufacture with shipping charges prepaid by the Buyer. Omni International shall make a reasonable determination as to the existence or cause of any alleged defect and warranty eligibility upon the return of the defective product. The foregoing warranty shall not be valid if 1) Omni International is not promptly notified in writing of a defect within fifteen (15) days after the defect is noted or 2) if the product has been subjected to abuse, misuse, accident, alteration, neglect, unauthorized repair or installation.

THE FOREGOING WARRANTY IS MADE EXPRESSLY IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY AND ANY WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, AND ANY OTHER OBLIGATIONS OR LIABILITY ON THE PART OF OMNI INTERNATIONAL, INC. (THE SELLER). IN NO EVENT, INCLUDING THE CASE OF A CLAIM OF NEGLIGENCE, SHALL OMNI INTERNATIONAL BE LIABLE FOR INCIDENTAL AND/OR CONSEQUENTIAL DAMAGES.