

RAPIDVAP®

EVAPORATION SYSTEMS



Protecting your
laboratory environment

LABCONCO

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An Overview

RapidVap Evaporation Systems are multiple-sample evaporators that use a combination of gentle forces — vortex motion and heat with either vacuum or nitrogen blow down — to quickly reduce samples to dryness or an end point volume. These systems have sleek styling and robust programmability. Up to 9 different protocols may be entered into memory so exact test parameters can be easily repeated.

RapidVap Systems are built to resist attack from strong chemicals. The chamber and sample block are Teflon*-coated and all mechanical components such as bearings are isolated from chemical fumes and vapors. Two distinct RapidVap Systems are offered; to accelerate evaporation, one utilizes vacuum and the other utilizes nitrogen blow down.

The Heat Advantage

Heat helps speed the evaporation process. A precisely controlled dry heating system in direct contact with the sample block supplies heat up to 100° C. Unlike water bath heaters, dry heat requires no maintenance and adds no potential source of contamination. The heater may be used to preheat the block prior to loading samples and/or may be activated during the run to overcome evaporative cooling effects by volatile solvents. The heater orbits with the vortexing block so lower heater temperatures are required.

The Benefits of Vortex Motion

The vortex motion of RapidVap Evaporation Systems optimizes evaporation and recovery of analytes. Each tube moves in a gentle orbital motion. A microprocessor controls the speed of motion desired. This agitation causes the liquid sample in the tube to form a vortex-like configuration which greatly increases the sample's surface area and ability to evaporate. Vortex motion also helps to mix the components in the liquid sample so the end point sample better represents the pre-processed mixture. The vortexing feature allows solvent exchange and/or resuspension procedures to be performed while samples remain in the block, thus saving time and additional glassware handling steps. Finally, as the liquid forms the vortex shape, a centrifugal force is established which forces the liquid outward against the tube walls. This force helps prevent bumping and potential loss of sample so recovery is enhanced.

* Teflon® is a registered trademark of E. I. Dupont.



The gentle agitation of the sample tube causes the liquid to form a vortex-like configuration which increases the sample's surface area and ability to evaporate.



The RapidVap Vacuum Evaporation System uses vacuum, heat and vortex motion to speed evaporation.

RapidVap Vacuum Evaporation Systems

The RapidVap Vacuum Evaporation System is ideal for preparation of samples in a variety of applications including drug discovery, agrichemistry, mycology testing and environmental analysis. The system uses vacuum along with heat and vortex motion to help speed evaporation and provides an alternative to traditional centrifugal evaporation methods. A microprocessor provides precise control of the vacuum level so that bumping can be minimized, preventing loss of sample. A port on the back of the RapidVap Vacuum System allows attachment to an accessory diaphragm or rotary vane vacuum pump.

The RapidVap Vacuum Evaporation System accommodates seven different, interchangeable accessory sample blocks holding sample volumes from just a few milliliters to as large as 450 milliliters. The blocks hold more samples than ever before, offering greater throughput. As many as 110 each 12 or 13 mm tubes may be loaded at once. Additional blocks accommodate various tube types including conical centrifuge tubes and scintillation vials. Custom blocks to fit special glassware configurations such as VOA vials are also available.

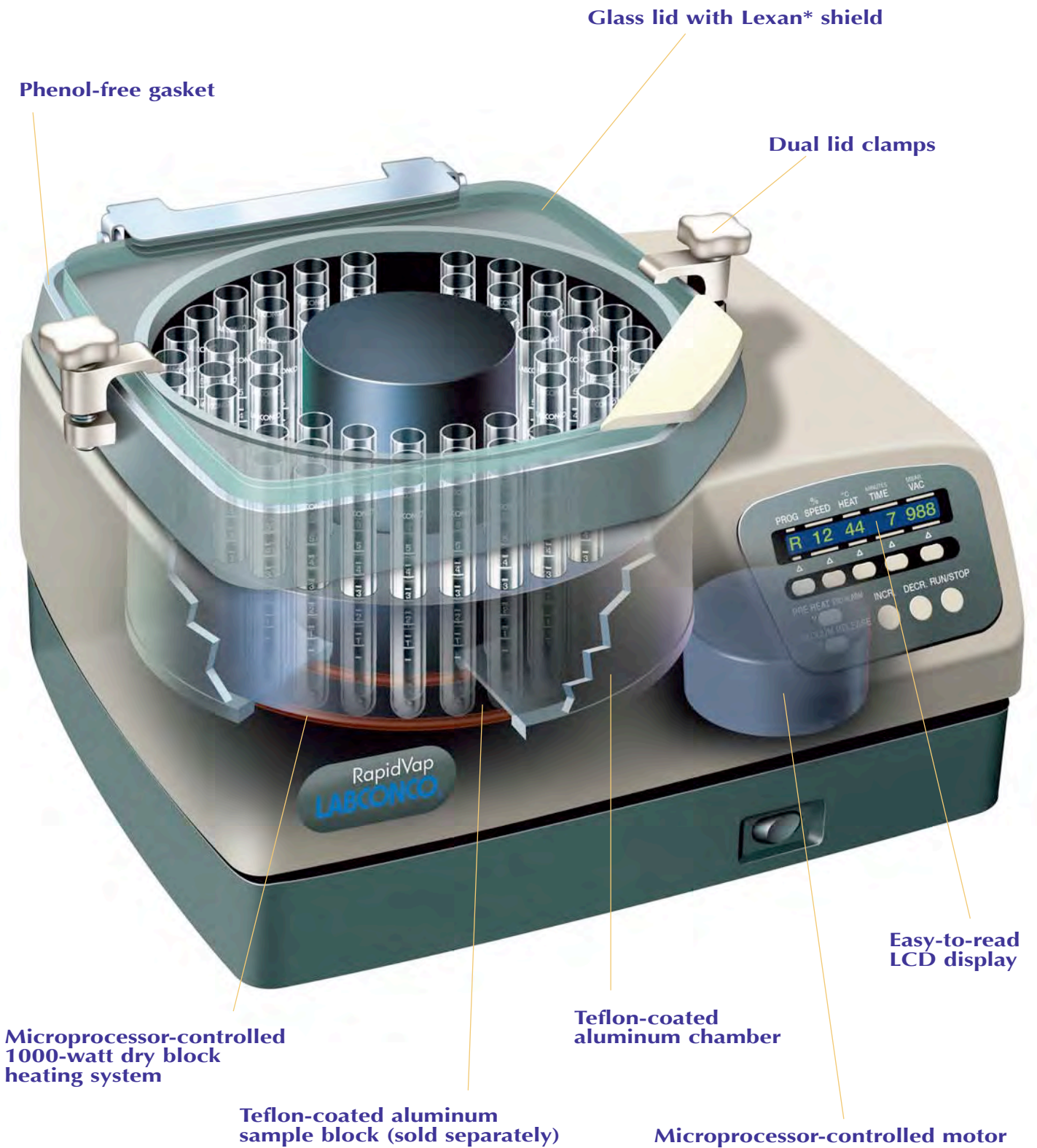
RapidVap N₂ and N₂/48 Evaporation Systems

The RapidVap N₂ and N₂/48 Evaporation Systems offer a more efficient, automatic alternative to Kuderna-Danish and rotary evaporators. In these systems, a stream of nitrogen or dry gas is directed downward onto the surface of the sample. Nitrogen blow down reduces the partial pressure directly over the liquid to speed evaporation and help remove the solvent as it evaporates. Nitrogen may be programmed for two, four, six or all eight tube locations. On the RapidVap N₂/48, eight clusters of six ports each allow for up to 48 small samples. Various blocks hold different sample sizes, from 4.5 to 26 milliliters.

The block that comes with the RapidVap N₂ holds eight large samples, up to 450 milliliters each, making it efficient for environmental and residue testing. An accessory block that holds eight 170 milliliter tubes is also available. In many of these applications, the samples should not go to dryness. The unique Cool-Zone™ block and tube design significantly reduces the evaporation rate after end point is achieved. The Cool-Zone insulates the samples and allows the researcher adequate time before the samples reach dryness to remove them or to perform solvent exchange procedures. Alarms that signal when timed end point has occurred and when the RapidVap senses that the process is nearing completion allow for unattended operation.



In the RapidVap N₂/48 Evaporation System, nitrogen blow down, heat and vortex motion combine to quickly reduce multiple samples.



800-821-5525

* Lexan® is a registered trademark of General Electric Company.



Features and Benefits

-  **Faster evaporation rates, greater throughput.**
Vortex action, heat and vacuum combine to accelerate evaporation. Up to 110 samples may be processed at once. See page 6 for evaporation rates. See page 20 for recovery rates.
-  **Microprocessor-controlled vacuum level speeds evaporation.**
Microprocessor controls vacuum at a preset level. Rear-mounted 1/2" OD port attaches to a vacuum pump (sold separately).
- Automatic vacuum release.**
Vacuum is automatically released in the event of power failure.
-  **Microprocessor-controlled 1000-watt dry block heating system.**
Speeds evaporation rate by supplying a controlled amount of heat from ambient up to a maximum of 100° C to the sample block. The heater and block move in tandem for more efficient heat transfer. Unlike water baths, the dry heating system adds no potential source of contamination and requires no maintenance.
-  **Microprocessor-controlled vortex motion increases surface area for faster evaporation.**
Vortex action continually mixes the sample, helps contain analytes in the solvent, minimizes bumping and maximizes sample recovery. It also performs a time-saving function in resuspension and solvent exchange procedures.
-  **Maintenance-free microprocessor-controlled motor.**
Reliable belt-driven system provides smooth variable-speed power to drive the vortex motion up to 1000 rpm. Non-sparking, brushless DC motor ensures safety, control and reproducibility of protocols.
- Teflon-coated aluminum chamber.**
Conducts heat efficiently and resists corrosion.
- Teflon-coated aluminum sample blocks are interchangeable and hold more tubes than ever before.**
Blocks are sold separately. See page 8. Custom blocks for other tube configurations are also available.
- Durable construction with sleek styling.**
The cabinet base is epoxy-coated cast aluminum. The upper housing is solvent-resistant, smooth acrylic/PVC thermoplastic.
- Glass lid with Lexan shield.**
Provides visibility of samples, is chemical resistant and detaches for cleaning. Lexan shield provides protection from an unlikely glass implosion.
- Dual lid clamps.**
Two clamps hold the lid securely in place for a vacuum tight seal.
-  **Phenol-free gasket.**
Provides complete sealing under vacuum without potential for phenol contamination.
-  **Alarm signals completion of run allowing samples to be left unattended while evaporating to desired end point.**
The RapidVap Vacuum System has two means to signal completion of a run. With the first method, the operator sets the end point time and **when set time has expired an audible alarm sounds and the RapidVap automatically turns off all functions.** With the second method, the RapidVap monitors system temperature in the block and in the heater. Once the system senses that end point is near, the alarm sounds every 10 seconds and the PREHEAT/END ALARM indicator light flashes.
-  **Convenient, easy-to-set programming.**
Parameters of time, heat, vortex speed and vacuum may be easily set with the touch of a few buttons. Up to 9 different user-set programs, each with different parameter set points, may be stored in memory. In addition, the user may alter parameters while a program is in progress.
- Easy-to-read LCD display.**
Prompts user to set program parameters and displays program number and actual and set point vortex speeds, temperatures, time remaining and vacuum levels. See details on page 6.
- Improved chemical compatibility.**
The operator may use a broad range of aggressive chemicals. Contact Labconco for specific chemical compatibility.
- All mechanical components are isolated from the chemical fumes and vapors for longer life.**
- ETL listed.**
All 115 volt models carry the ETL Testing Laboratories seal in the U.S. and ETL-C seal in Canada, signifying they meet or exceed all minimum requirements of UL Standard 61010A-1 and CAN/CSA C22.2 No. 1010.1.
- International electrical configurations available.**
All 230 volt models conform to the CE (European Community) requirements for electrical safety and electromagnetic compatibility.
- Reliability guarantee.**
Full one year warranty is provided against defects in materials and workmanship.
-  **Optional Lid Heater improves visibility.**
A 40-watt heater is securely bonded to the glass lid, which electrically connects to the RapidVap via a receptacle on the back of the housing. Heating the lid helps eliminate condensation caused by evaporating high boiling point solvents.

Control Panel

Program parameter.

LCD shows program from 1 to 9, R for run, or S for stop.

LCD display.

Prompts user to set program parameters and displays program number, actual and set point vortex speed by percentage, actual and set point temperature in °C, time remaining in minutes, and actual and set point vacuum level in mBar.

Speed parameter.

LCD shows speed from 0 to 100%.

Heat parameter.

LCD shows heat from OFF to 99 (°C) or HI (100° C).

Time parameter.

LCD shows time selected from 1 to 999 minutes. During the run, the LCD shows time remaining. If RUN is selected instead of a time period, the RapidVap runs continuously.

Vacuum parameter.

LCD shows vacuum level from 0 to 999 mBar. Above 999 mBar, the display shows HI and the vacuum pump does not operate.

Vacuum Release button with indicator light.

Pressing the button momentarily breaks the vacuum to control bumping. Vacuum returns to its preset level once the button is released.

Set point selection buttons.

To select a parameter to change, press the set point select button directly below the parameter.

Run/Stop button.

Initiates the start or stop of the selected program.

Preheat/End Alarm button with indicator light.

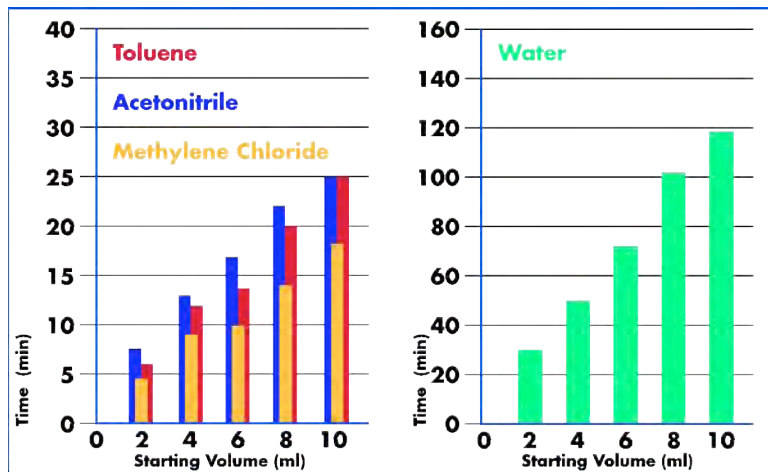
Pressing the button activates the heater to begin elevating the block to set point temperature. When in preheat mode, the operator may monitor actual heat, adding samples and starting program once set point temperature has been reached. During a run, the indicator light flashes when end point has been detected by the temperature sensors. Pressing the button while the light is flashing switches the end point alarm from audible to muted or back to audible.



Evaporation Rates

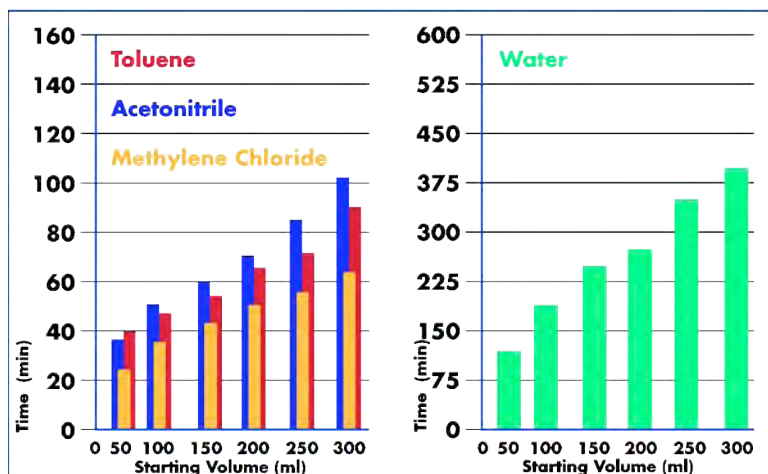
Solvent	Temp.	Vacuum	Overall Evap. Rate
Methylene Chloride	50°C	200 mBar	.56 ml/min./tube
Toluene	80°C	200 mBar	.40 ml/min./tube
Acetonitrile	75°C	330 mBar	.40 ml/min./tube
Water	80°C	133 mBar	.08 ml/min./tube

Number of samples: 69
 Tube diameter: 16 mm
 Block used: 7491400, 69 tube capacity
 Ending volume: dryness
 Vortex speed: 95%
 Vacuum pump displacement capacity: 88 liters/minute
 Maximum attainable vacuum: 31 mBar



Solvent	Temp.	Vacuum	Overall Evap. Rate
Methylene Chloride	50°C	250 mBar	4.8 ml/min./tube
Toluene	80°C	133 mBar	3.3 ml/min./tube
Acetonitrile	75°C	167 mBar	2.9 ml/min./tube
Water	80°C	133 mBar	.75 ml/min./tube

Number of samples: 8
 Tube used: 7909200,
 600 ml tube, flat bottom, 75 mm diameter
 Block used: 7494500,
 8 tube capacity
 Ending volume: dryness
 Vortex speed: 28%
 Vacuum pump displacement capacity: 88 liters/minute
 Maximum attainable vacuum: 31 mBar



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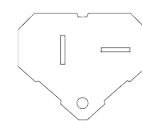
Specifications

- Epoxy-coated aluminum base with acrylic/PVC thermoplastic upper housing.
- Glass lid with Lexan shield.
- Dual lid clamps.
- Phenol-free gasket.
- Teflon-coated aluminum chamber.
- Rear-mounted 1/2" OD vacuum port, 30" of 1/2" ID vacuum tubing, two tubing clamps and lid heater receptacle.
- 1000-watt dry block heating system.
- Microprocessor-controlled programming for vortex speed from 0 to 100%; heat from OFF to 100° C; time from 1 to 999 minutes; vacuum level from 0 to 999 mBar. Memory stores 1 to 9 programs.
- LCD for display of program number and actual and set point vortex speeds, temperatures, time remaining, and point vacuum level.
- Control panel with RUN/STOP button, PREHEAT/END ALARM button and indicator light, VACUUM RELEASE button and indicator light, set point selection buttons, and increase/decrease programming buttons.
- Belt-driven, non-sparking, brushless DC motor with smooth variable-speed power to drive the vortex motion up to 1000 rpm.
- Audible alarm for timed end point.
- Audible/visual alarm for end point detected by temperature sensors at heater and block.
- Automatic vacuum release in the event of power failure.
- All mechanical components isolated from chemical fumes and vapors.
- 115 volt models include 6 1/2 foot, three-wire electrical cord with 20 amp plug. **A 20 amp minimum circuit breaker is required.**
- 230 volt models include 6 1/2 foot, three-wire electrical cord with 15 amp plug. **A 10 amp minimum circuit breaker is required.**
- ETL and ETL-C listing on all 115 volt, 60 Hz models.
- CE mark on all 230 volt, 50 Hz models.
- Overall dimensions with closed lid: 20.7" wide x 18.4" deep x 13.5" high (52.6 x 46.7 x 34.3 cm).
- Overall dimensions with open lid: 20.7" wide x 21.3" deep x 24.9" high (52.6 x 54.1 x 63.2 cm).
- Actual weight 92 lbs. (42 kg)
- Shipping weight 100 lbs. (45 kg)

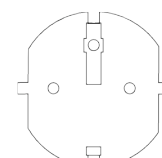


Options

- **Glass lid** with 40-watt heater.
- **RS-232 Link.** RS-232 port, located on the rear of the unit, for 2-way communication at 4800 baud, no parity, 8 bit word, 1 stop bit and 3-wire interface.



115 volt,
20 amp plug



230 volt,
15 amp plug

Accessories required (not included)

- **Vacuum pump.** See page 9.
- **Sample block.** See page 8.
- **Glassware.** See page 8 or contact your laboratory supply dealer.

The RapidVap Vacuum Evaporation System should be located within a fume hood if hazardous or flammable solvents are used. In all cases, regardless of the solvent used, it is recommended that the vacuum pump be vented in a fume hood.

* International electrical configuration
 ** Amperage shown includes 8 amp maximum vacuum pump rating.
 † Amperage shown includes 4.5 amp maximum vacuum pump rating.

Ordering Information

Catalog Number	Electrical Specifications	Lid Heater	RS-232 Link
7900000	115 volts, 50/60 Hz, 16 amps**		
7900001*	230 volts, 50/60 Hz, 8 amps†		
7900002	115 volts, 50/60 Hz, 16 amps**	x	
7900003*	230 volts, 50/60 Hz, 8 amps†	x	
7900010	115 volts, 50/60 Hz, 16 amps**		x
7900011*	230 volts, 50/60 Hz, 8 amps†		x
7900012	115 volts, 50/60 Hz, 16 amps**	x	x
7900013*	230 volts, 50/60 Hz, 8 amps†	x	x

Accessories



Teflon-Coated Aluminum Blocks

A block is required for all RapidVap Vacuum Evaporation Systems. Blocks are interchangeable. Custom blocks to fit special glassware such as VOA vials are available on request. **Glassware is required (not included).** See below for ordering information on Flat-Bottom Tubes for Blocks 7494500 and 7486400. For glassware for all other Blocks, contact your laboratory supply dealer.

Catalog Number	Block Tube Capacity	Sample Tube Size	Sample Volume (ml)	Shipping Weight (lbs./kg)
7491300	110	12 mm OD tubes, up to 6 ml*	4.5**	8/3.6
7485800	110	13 mm OD tubes, up to 10 ml*	7.5**	8/3.6
7491400	69	16 mm OD tubes, up to 23 ml*	17**	7.4/3.4
7496300	69	15 ml conical centrifuge tubes, up to 15 ml*	11**	7.8/3.5
7496400	26	28 mm OD scintillation vials, up to 50 ml*	34**	8.3/3.8
7494500	8	600 ml borosilicate glass tubes	450**	6.4/2.9
7486400	8	170 ml borosilicate glass tubes	125**	8.2/3.7

*Maximum tube height is 150 mm.

**Actual sample volumes depend on tube shape, height and vortex speed.



600 ml Flat-Bottom Tube
7909200 and 170 ml
Flat-Bottom Tube 7927000

Flat-Bottom Tubes

Borosilicate glass tubes offer better fit and heat transfer for faster evaporation rates.

Catalog Number	Sample Tube Size (ml)	Sample Volume (ml)	For Block	Quantity per Package	Shipping Weight
7909200	600	450	7494500	1	1 lb. (0.4 kg)
7913408	600	450	7494500	8	4 lbs. (1.8 kg)
7927000	170	125	7486400	1	1 lb. (0.4 kg)
7927108	170	125	7486400	8	4 lbs. (1.8 kg)



Eight-Place Stainless Steel Racks
7487600 and 7486300

Eight-Place Stainless Steel Racks

Catalog Number	Holds	Shipping Weight
7487600	600 ml Tubes	2 lbs. (0.9 kg)
7486300	170 ml Tubes	2 lbs. (0.9 kg)

Glass Lid with Heater 7486500

If your application involves water or other high boiling point solvents, a Lid Heater improves visibility and eliminates solvent condensation on the inside of the lid. The glass lid, with 40-watt heater bonded to it, plugs into the electrical receptacle located on the back of the RapidVap. For 115 or 230 volt operation. See page 7 for RapidVap models with built-in lid heater. Shipping weight 6 lbs. (2.7 kg).

Accessories



Diaphragm Vacuum Pump 7393000

Diaphragm Vacuum Pumps

The wetted parts of these pumps are Teflon-coated for corrosion resistance. Vacuum outlet is 1/2" OD.

Catalog Number	Electrical Specifications	Vacuum mBar	Displacement Capacity (liters/minute)	Explosion-Proof	Shipping Weight (lbs./kg)
7393000	115V, 60 Hz, 3.5 amps	1.5	63	No	40/18.1
7393001*	230V, 50/60 Hz, 2.0 amps	1.5	57/63**	No	40/18.1

* International electrical configuration. Power cord has reverse IEC plug.

** Displacement at 50/60 Hz



Liquid Trap 7873400

Liquid Trap 7873400

Prevents liquid from entering the pump. Made of borosilicate glass. Trapping capacity is 2550 milliliters. **Required accessory for diaphragm pump when using high boiling point solvents.** Shipping weight 4 lbs. (1.8 kg).



Dry Ice Vacuum Trap 7538200

Dry Ice Vacuum Traps

When dry ice and solvent are added to the well, these secondary traps cool to approximately -75° C (-103° F). Inlet and outlet vacuum connections are 1/2" OD.

Catalog Number	Dimensions (h x dia.)	Well volume of dry ice and alcohol (liters)	Ice trapping capacity (ml)	Liquid trapping capacity (liters)	Shipping Weight (lbs./kg)
7538200	9 3/4" x 7 7/8" (24.8 cm x 20 cm)	2.85	900	2	9/4.1
7538400	7 7/8" x 6 5/8" (20 cm x 16.8 cm)	1.80	200	1	5/2.3



Clear Canister 7815300 with Solvent Trap Insert 7815200

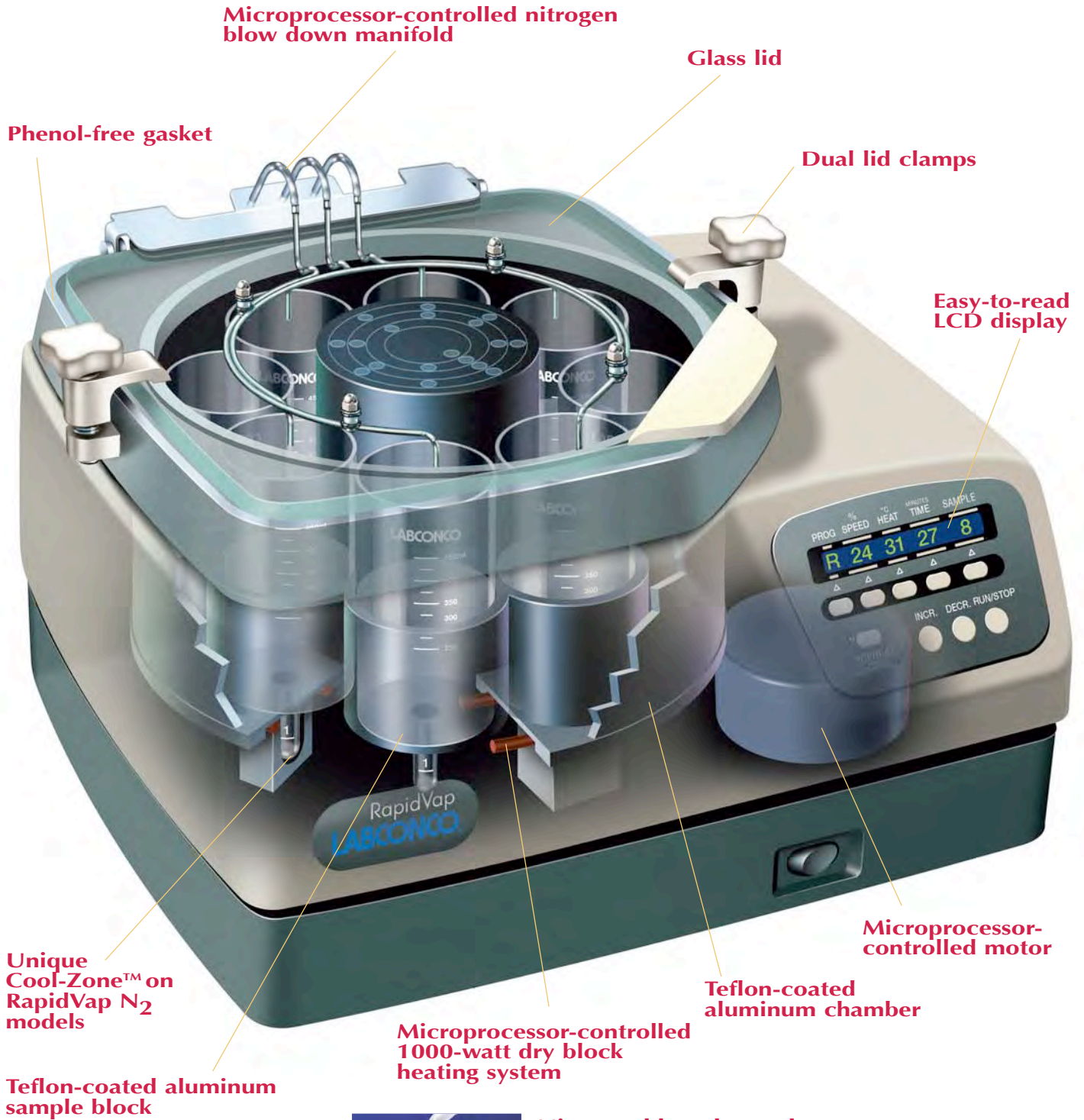
Chemical Traps

Connect between the accessory vacuum trap and vane pump to provide additional protection to the pump.

Catalog Number	Trap Insert	Description	Shipping Weight (lbs./kg)
7815300	Clear Acrylic Canister with stand accommodates any trap insert listed below		5/2.3
7814800	Acid	Acid neutralizing desiccant	4/1.8
7814900	Moisture	Desiccant	4/1.8
7815000	Radioisotope	Molecular sieve	4/1.8
7815200	Solvent	Activated carbon	4/1.8
7995600	Ammonia	Impregnated carbon	4/1.8

Vacuum Tubing Kit 7814500

For use when connecting accessory traps to a vacuum system. Includes two each 1/2" ID vacuum tubing, 48" length, and 4 tubing clamps. Shipping weight 6 lbs. (2.7 kg).



Nitrogen blow down cluster on RapidVap N₂/48 models

800-821-5525



Features and Benefits

- Fast evaporation rates, greater throughput.**
Vortex action, heat and nitrogen blow down combine to speed evaporation. Eight samples with volumes up to 450 ml each may be processed at once in the RapidVap N₂ and up to 48 samples with volumes up to 26 ml each in the RapidVap N₂/48. See pages 14 and 16 for evaporation rates. See pages 21-22 for recovery rates.

Microprocessor-controlled nitrogen blow down manifold.
Allows user to introduce nitrogen to 2, 4, 6 or 8 individual sample tubes on the RapidVap N₂ or clusters of 6 on the RapidVap N₂/48, conserving nitrogen when less than a full load is being processed. Nitrogen blown onto the surface of the sample helps facilitate the phase change from liquid to gas.
- Microprocessor-controlled 1000-watt dry block heating system.**
Speeds evaporation rate by supplying a controlled amount of heat from ambient up to a maximum of 100° C to the sample block. The heater and block move in tandem for more efficient heat transfer. Unlike water baths, the dry heating system adds no potential source of contamination and requires no maintenance.
- Microprocessor-controlled vortex motion increases surface area for faster evaporation.**
Vortex action continually mixes the sample, helps contain analytes in the solvent by constantly rinsing the tube walls, and maximizes sample recovery.
- Maintenance-free microprocessor-controlled motor.**
Reliable belt-driven system provides smooth variable-speed power to drive the vortex motion up to 500 rpm. Non-sparking, brushless DC motor ensures safety, control and reproducibility for protocols.

Teflon-coated aluminum sample block.
Provides efficient heat transfer, low maintenance and corrosion resistance. Block is easy to remove for cleaning or replacement. One 8-place block that holds 600 ml tubes is included with RapidVap N₂ models. Four accessory blocks holding 48 samples of various volumes are offered for the RapidVap N₂/48 models.

Teflon-coated aluminum chamber.
Conducts heat efficiently and resists corrosion.

Durable construction with sleek styling.
The cabinet base is epoxy-coated cast aluminum. The upper housing is solvent-resistant, smooth acrylic/PVC thermoplastic.

Glass lid.
Provides visibility of samples, is chemical resistant and detaches for cleaning.

Dual lid clamps.
Two clamps hold the lid securely in place.
- Phenol-free gasket.**
Provides a positive seal without potential for phenol contamination.

Improved chemical compatibility.
The operator may use a broad range of aggressive chemicals. Contact Labconco for specific chemical compatibility.
- Unique Cool-Zone on RapidVap N₂.**
Insulates sample remaining in glassware stem to permit processing to a desired end point. See page 13 for more information.
- Alarm signals completion of run allowing samples to be left unattended while evaporating to desired end point.**
The RapidVap N₂ and N₂/48 have two means to signal completion of a run. With the first method, the operator sets the end point time and **when set time has expired an audible alarm sounds and the RapidVap automatically turns off all functions.** With the second method, the RapidVap monitors system temperature in the block and in the heater. During operation, evaporative cooling of the solvent creates a differential between the block and heater temperatures. Once evaporation is nearly complete, the two temperatures equalize indicating end point is near. The alarm sounds and the PREHEAT/END ALARM indicator light flashes.
- Convenient, easy-to-set programming.**
Parameters of time, heat, vortex speed and number of samples may be easily set with the touch of a few buttons. Up to 9 different user-set programs, each with different parameter set points, may be stored in memory. The user may alter parameters while a program is in progress.

Easy-to-read LCD display.
Prompts user to set program parameters and displays program number, number of active nitrogen positions, and actual and set point vortex speeds, temperatures, and time remaining. See details on page 12.

All mechanical components are isolated from chemical fumes and vapors for longer life.

ETL listed.
All 115 volt models carry the ETL Testing Laboratories seal in the U.S. and ETL-C seal in Canada, signifying they meet or exceed all minimum requirements of UL Standard 61010A-1 and CAN/CSA C22.2 No. 1010.1.

International electrical configurations available.
All 230 volt models conform to the CE (European Community) requirements for electrical safety and electromagnetic compatibility.

Reliability guarantee.
Full one year warranty is provided against defects in materials and workmanship.

Exclusive feature

Control Panel

Program parameter.

LCD shows program from 1 to 9, R for run or S for stop.

Speed parameter.

LCD shows vortex speed from 0 to 100%.

Heat parameter.

LCD shows heat from OFF to 99 (° C) or HI (100° C).

Time parameter.

LCD shows time selected from 1 to 999 minutes. During the run, the LCD shows time remaining. If RUN is selected instead of a time period, the RapidVap runs continuously.



Sample parameter.

LCD shows number of samples or clusters of samples selected to receive nitrogen blow down; 2, 4, 6 or 8 may be selected.

Set point selection buttons.

To select a parameter to change, press the set point select button directly below the parameter.

LCD display.

Prompts user to set program parameters and displays program number, actual and set point vortex speed by percentage, actual and set point temperature in ° C, time remaining in minutes, and number of active nitrogen positions.

Increase/Decrease buttons.

Used to increase or decrease the last selected set point parameter.

Run/Stop button.

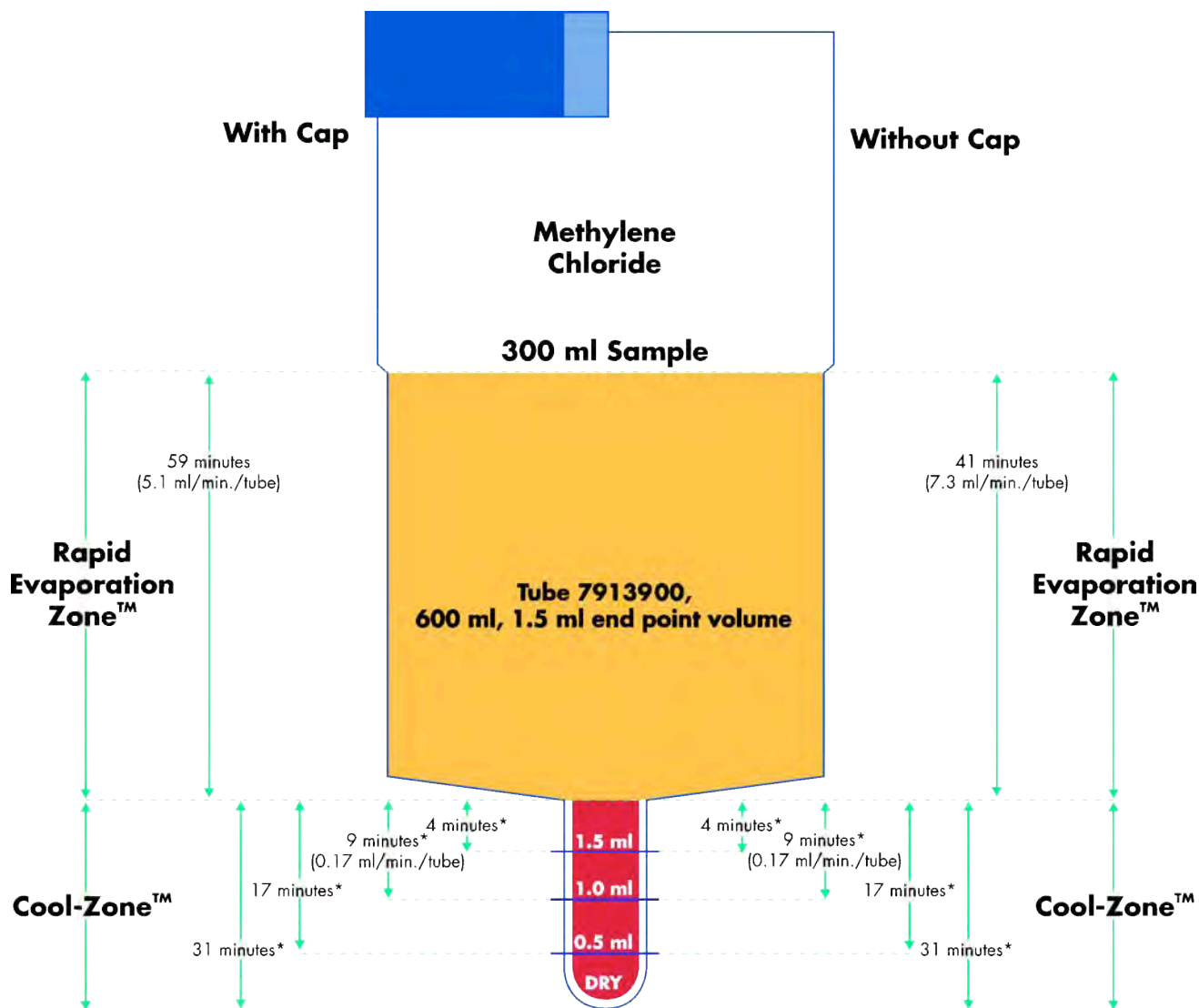
Initiates the start or stop of the selected program.

Preheat/End Alarm button with indicator light.

Pressing the button activates the heater to begin elevating to set point temperature. When in preheat mode, the operator may monitor actual heat, adding samples and starting program once set point temperature has been reached. In addition, the indicator light flashes when end point has been detected by the temperature sensors. Pressing the button while the light is flashing switches the end point alarm from audible to muted or back to audible.

Rapid Evaporation Zone™ and Cool-Zone™

This illustration demonstrates the effectiveness of the Rapid Evaporation Zone and the Cool-Zone in RapidVap N₂ models. In the Rapid Evaporation Zone, a 300 ml sample of methylene chloride is evaporated in 41 minutes at approximately 7.3 ml/minute/tube (without cap). In the Cool-Zone with vortex motion, heat and nitrogen blow down still applied, methylene chloride is evaporated to a 1.0 ml end point in 9 minutes at a much slower rate, approximately 0.11 ml/minute/tube. If the RapidVap is programmed for timed end point, all functions automatically turnoff when time expires drastically slowing the evaporation rate. While samples are in the Cool-Zone, the user has ample time to retrieve samples or to perform solvent exchange procedures.



Number of samples: 8
 Nitrogen pressure: 10 psi
 Vortex speed: 70%
 Temperature: 40°C

*Time shown is with nitrogen blow down, vortex motion and heat still applied. Time would be longer if all functions were turned off.

Evaporation Rates



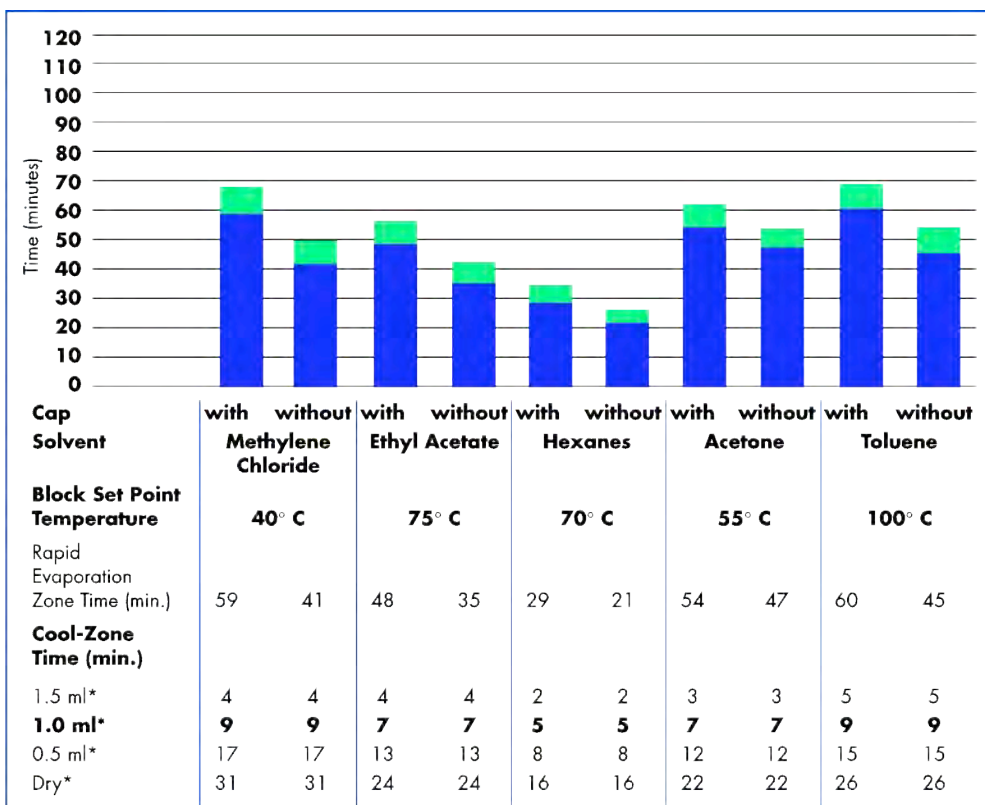
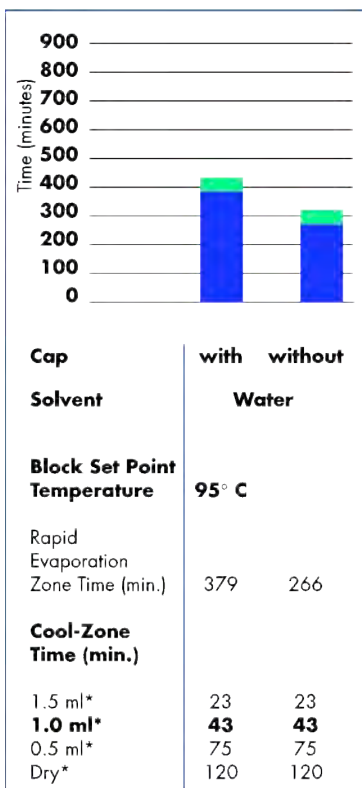
The charts on this page indicate the evaporation times for the Rapid Evaporation Zone and the Cool-Zone. Times were determined with and without Glassware Caps over the sample tubes. Placing Glassware Caps over the sample tubes prevents contamination and prevents moisture from condensing in low boiling point solvents. The use of caps increases overall evaporation time 10 to 80 percent.

RapidVap Evaporation Zone Rate Summary

Solvent	Evaporation Rate with cap	Evaporation Rate without cap
Water	.79 ml/min./tube	1.1 ml/min./tube
Methylene Chloride	5.1 ml/min./tube	7.3 ml/min./tube
Ethyl Acetate	6.3 ml/min./tube	8.6 ml/min./tube
Hexanes	10.3 ml/min./tube	14.3 ml/min./tube
Acetone	5.6 ml/min./tube	6.4 ml/min./tube
Toluene	5.0 ml/min./tube	6.7 ml/min./tube

Number of samples: 8
 Tube used: 7913900, 600 ml tube with 1.5 ml end point stem, 1.37" (3.5 cm) long
 Starting volume: 300 ml
 Ending volume: 1.0 ml
 Nitrogen pressure: 10 psi
 Vortex speed: 70% of maximum setting

■ Rapid Evaporation Zone
 ■ Cool-Zone



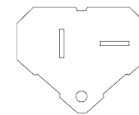
Specifications

- Epoxy-coated aluminum base with acrylic/PVC thermoplastic upper housing.
- Glass lid.
- Dual lid clamps.
- Phenol-free gasket.
- Teflon-coated aluminum chamber.
- Teflon-coated aluminum sample block capable of holding 8 each 600 ml tubes. Glassware sold separately.
- 1000-watt dry block heating system.
- Microprocessor-controlled programming for vortex speed from 0 to 100%; heat from OFF to 100° C; time from 1 to 999 minutes; and number of active nitrogen positions, 2, 4, 6 or 8. Memory stores 1 to 9 programs.
- LCD for display of program number, actual and set point vortex speed, actual and set point temperature, time remaining, and number of active nitrogen positions. Memory stores 1 to 9 programs.
- Control panel with RUN/STOP button, PREHEAT/END ALARM button and indicator light, set point selection buttons, and increase/decrease programming buttons.
- Belt-driven, non-sparking, brushless DC motor with smooth variable-speed power to drive the vortex motion up to 500 rpm.
- Audible alarm with automatic shut down for timed end point.
- Audible/visual alarm for end point detected by temperature sensors at heater and block.
- Nitrogen inlet port supplied with a 1/4" male NPT thread.
- All mechanical components isolated from chemical fumes and vapors.
- Includes 8 polyethylene glassware caps, 6 feet of 2" dia. exhaust tubing, 78" of tubing for nitrogen supply and one tubing clamp.
- 115 volt models include 6 1/2 foot, three-wire electrical cord with 20 amp plug. **A 15 amp minimum circuit breaker is required.**
- 230 volt models include 6 1/2 foot, three-wire electrical cord with 15 amp plug. **An 8 amp minimum circuit breaker is required.**
- ETL and ETL-C listing on all 115 volt, 60 Hz models.
- CE mark on all 230 volt, 50 Hz models.
- Overall dimensions with closed lid: 21.7" wide x 19" deep x 13.5" high (55.1 x 48.3 x 34.3 cm).
- Overall dimensions with open lid: 21.7" wide x 21.3" deep x 24.9" high (55.1 x 54.1 x 63.2 cm).
- Actual weight 99 lbs. (45 kg)
- Shipping weight 107 lbs. (49 kg)

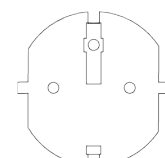


Option

- **RS-232 Link.** RS-232 port, located on the rear of the unit, for 2-way communication at 4800 baud, no parity, 8 bit word, 1 stop bit and 3-wire interface.



115 volt,
20 amp plug



230 volt,
15 amp plug

Accessories required (not included)

- **Glassware.** See page 18.
- **Nitrogen with maximum flow rate of 0.6 CFM.** Contact your nitrogen gas supplier.
- **Gas pressure regulator.** Pressure of 5-10 psi is typical. Pressure must not exceed 15 psi. Contact a local supplier.

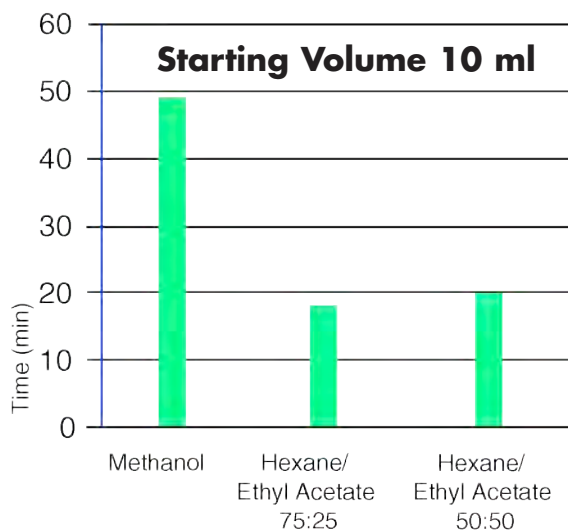
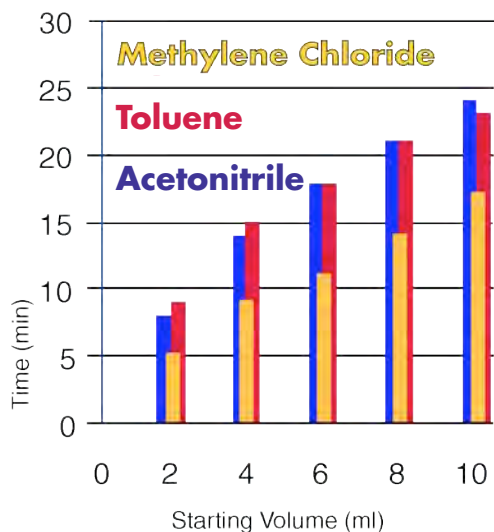
The RapidVap N₂ Evaporation System should be located within a fume hood if hazardous or flammable solvents are used. In all cases, regardless of the solvent used, it is recommended that the exhaust hose be vented into a fume hood or other laboratory ventilation device.

* International electrical configuration

Ordering Information

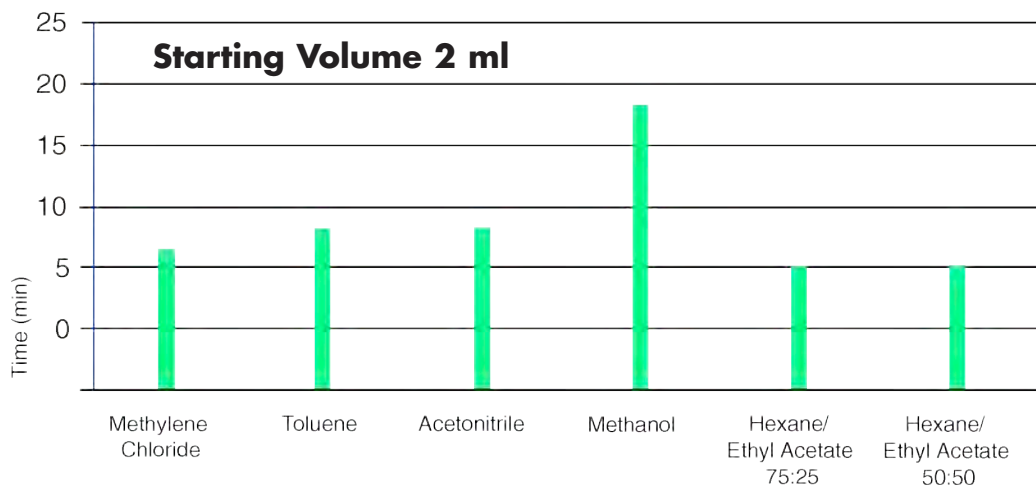
Catalog Number	Electrical Specifications	RS-232 Link
7910000	115 volts, 50/60 Hz, 9 amps	
7910001*	230 volts, 50/60 Hz, 4.5 amps	
7910010	115 volts, 50/60 Hz, 9 amps	x
7910011*	230 volts, 50/60 Hz, 4.5 amps	x

Evaporation Rates



Number of samples: 48
 Tube size: 20 mm
 Block used: 7482400
 Ending volume: dryness
 Vortex speed: 100%
 Nitrogen pressure: 20 psi

Solvent	Temp.	Overall Evap. Rate
Methylene Chloride	50° C	.59 ml/min./tube
Toluene	80° C	.43 ml/min./tube
Acetonitrile	75° C	.42 ml/min./tube
Methanol	40° C	.20 ml/min./tube
Hexane/Ethyl Acetate 75:25	40° C	.56 ml/min./tube
Hexane/Ethyl Acetate 50:50	40° C	.50 ml/min./tube



Number of samples: 48
 Tube size: 12 mm
 Block used: 7482100
 Ending volume: dryness
 Vortex speed: 100%
 Nitrogen pressure: 8 psi

Solvent	Temp.	Overall Evap. Rate
Methylene Chloride	40° C	.33 ml/min./tube
Toluene	80° C	.25 ml/min./tube
Acetonitrile	75° C	.25 ml/min./tube
Methanol	40° C	.11 ml/min./tube
Hexane/Ethyl Acetate 75:25	40° C	.40 ml/min./tube
Hexane/Ethyl Acetate 50:50	40° C	.40 ml/min./tube

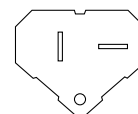
Specifications

- Epoxy-coated aluminum base with acrylic/PVC thermoplastic upper housing.
- Glass lid.
- Dual lid clamps.
- Phenol-free gasket.
- Teflon-coated aluminum chamber.
- 1000-watt dry block heating system.
- Microprocessor-controlled programming for vortex speed from 0 to 100%; heat from OFF to 100° C; time from 1 to 999 minutes; and number of active nitrogen clusters, 2, 4, 6 or 8. Memory stores 1 to 9 programs.
- LCD for display of program number, actual and set point vortex speed, actual and set point temperature, time remaining, and number of active nitrogen clusters.
- Control panel with RUN/STOP button, PREHEAT/END ALARM button and indicator light, set point selection buttons, and increase/decrease programming buttons.
- Belt-driven, non-sparking, brushless DC motor with smooth variable-speed power to drive the vortex motion up to 500 rpm.
- Audible alarm with automatic shut down for timed end point.
- Audible/visual alarm for end point detected by temperature sensors at heater and block.
- Nitrogen inlet hose, 1/4" ID.
- All mechanical components isolated from chemical fumes and vapors.
- Includes 6 feet of 2" dia. exhaust tubing, 78" of tubing for nitrogen supply and one tubing clamp.
- 115 volt models include 6 1/2 foot, three-wire electrical cord with 20 amp plug. **A 15 amp minimum circuit breaker is required.**
- 230 volt models include 6 1/2 foot, three-wire electrical cord with 15 amp plug. **An 8 amp minimum circuit breaker is required.**
- ETL and ETL-C listing on all 115 volt, 60 Hz models.
- CE mark on all 230 volt, 50 Hz models.
- Overall dimensions with closed lid: 21.7" wide x 19" deep x 13.5" high (55.1 x 48.3 x 34.3 cm).
- Overall dimensions with open lid: 21.7" wide x 21.3" deep x 24.9" high (55.1 x 54.1 x 63.2 cm).
- Actual weight 92 lbs. (42 kg)
- Shipping weight 100 lbs. (45 kg)

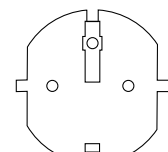


Option

- **RS-232 Link.** RS-232 port, located on the rear of the unit, for 2-way communication at 4800 baud, no parity, 8 bit word, 1 stop bit and 3-wire interface.



115 volt,
20 amp plug



230 volt,
15 amp plug

Accessories required (not included)

- **Sample Block.** See page 18.
- **Glassware.** Contact your laboratory supply distributor.
- **Nitrogen with maximum flow rate of 3.5 CFM.** Contact your nitrogen gas supplier.
- **Gas pressure regulator.** Pressure of 5-10 psi is typical. Pressure must not exceed 15 psi. Contact a local supplier.

The RapidVap N₂/48 Evaporation System should be located within a fume hood if hazardous or flammable solvents are used. In all cases, regardless of the solvent used, it is recommended that the exhaust hose be vented into a fume hood or other laboratory ventilation device.

Ordering Information

Catalog Number	Electrical Specifications	RS-232 Link
7910012	115 volts, 50/60 Hz, 9 amps	
7910013*	230 volts, 50/60 Hz, 4.5 amps	
7910014	115 volts, 50/60 Hz, 9 amps	x
7910015*	230 volts, 50/60 Hz, 4.5 amps	x

* International electrical configuration

Accessories



Teflon-Coated Aluminum Blocks (7486400 is not shown)

Teflon-Coated Aluminum Blocks

All RapidVap N₂ Evaporation Systems include an 8-Place Teflon-Coated Aluminum Block 7494500. Additional Blocks may be purchased for standby use. **All RapidVap N₂/48 Evaporation Systems require a Block (not included).** Custom blocks to fit special glassware such as VOA vials are available upon request. **Glassware is required (not included).**

Catalog Number	Block Tube Capacity	Sample Tube Size	Sample Volume (ml)	For Use with N ₂	For Use with N ₂ /48	Shipping Weight (lbs./kg)
7494500	8	600 ml borosilicate glass tubes, up to 600 ml	450 ml*	x	x	6.4/2.9
7486400	8	170 ml borosilicate glass tubes, up to 170 ml	125 ml*	x		8.2/3.7
7482100	48	12 x 75 mm OD tubes, up to 6 ml	4.5 ml*		x	8.0/3.6
7482200	48	13 x 100 mm OD tubes, up to 10 ml	7.5*		x	8.0/3.6
7482300	48	16 x 150 mm OD tubes, up to 23 ml	17*		x	7.4/3.4
7482400	48	20 x 150 mm OD tubes, up to 35 ml	26*		x	7.8/3.5

* Actual sample volumes depend on tube shape, height and vortex speed.



600 ml Tubes with Stems

Borosilicate Glass Tubes

For use with RapidVap N₂ Evaporation Systems only. The ground glass tubes offer better fit and heat transfer for faster evaporation rates. The stems are designed for use with Cool-Zone timed end point determinations. To minimize evaporation time, the tube with the correct end point stem should be used. For example, if an end point of 1.5 ml is desired, selecting Tube 7913500 with a maximum 3.0 ml end point volume would result in an unnecessarily long period required to evaporate the final 1.5 milliliters in the stem. Flat-bottom tubes are for use in applications when samples are taken to dryness. Use the chart below to select the correct tube for your sample volume size and desired end point volume.

Sample Volume	Desired End Point Volume	Tube Recommendations
up to 125 ml	Dryness	7927000, 7927108
up to 125 ml	≤1.5 ml	7926600, 7926908
up to 450 ml	Dryness	7909200, 7913408
up to 450 ml	≤0.5 ml	7925900, 7926008
up to 450 ml	0.6-1.5 ml	7913900, 7914000
up to 450 ml	1.6-2.0 ml	7913700, 7913808
up to 450 ml	2.1-3.0 ml	7913500, 7913608

600 ml Tubes with Stems for Block 7494500

Each graduated 600 ml tube has a sample capacity of up to 450 ml when vortexing.

Catalog Number	End Point Volume	Calibration Markings	Quantity per Package	Shipping Weight
7925900**	0.5 ml	0.5 ml	1	1 lb. (0.4 kg)
7926008**	0.5 ml	0.5 ml	8	4 lbs. (1.8 kg)
7913900**	1.5 ml	1.5, 1.0 and 0.5 ml	1	1 lb. (0.4 kg)
7914008**	1.5 ml	1.5, 1.0 and 0.5 ml	8	4 lbs. (1.8 kg)
7913700**	2.0 ml	2.0 and 1.0 ml	1	1 lb. (0.4 kg)
7913808**	2.0 ml	2.0 and 1.0 ml	8	4 lbs. (1.8 kg)
7913500**	3.0 ml	3.0, 2.0 and 1.0 ml	1	1 lb. (0.4 kg)
7913608**	3.0 ml	3.0, 2.0 and 1.0 ml	8	4 lbs. (1.8 kg)

** For use with RapidVap N₂ Evaporation Systems only.

Accessories



170 ml Tube with Stem

170 ml Tubes with Stems for Accessory Block 7486400

Each graduated 170 ml tube has a sample capacity of up to 125 ml when vortexing.

Catalog Number	End Point Volume	Calibration Markings	Quantity per Package	Shipping Weight
7926600*	1.5 ml	1.5, 1.0 and 0.5 ml	1	1 lb. (0.4 kg)
7926908*	1.5 ml	1.5, 1.0 and 0.5 ml	8	4 lbs. (1.8 kg)

* For use with RapidVap N₂ Evaporation Systems only.



600 ml Flat-Bottom Tube 7909200 and 170 ml Flat-Bottom Tube 7927000

Flat-Bottom Tubes

Borosilicate glass tubes offer better fit and heat transfer for faster evaporation rates.

Catalog Number	Sample Tube Size (ml)	Sample Volume (ml)	For Block	Quantity per Package	Shipping Weight
7909200	600	450	7494500	1	1 lb. (0.4 kg)
7913408	600	450	7494500	8	4 lbs. (1.8 kg)
7927000*	170	125	7486400	1	1 lb. (0.4 kg)
7927108*	170	125	7486400	8	4 lbs. (1.8 kg)

* For use with RapidVap N₂ Evaporation Systems only.



Eight-Place Stainless Steel Racks 7487600 and 7486300

Eight-Place Stainless Steel Racks

Catalog Number	Holds	Shipping Weight
7487600	600 ml Tubes	2 lbs. (0.9 kg)
7486300	170 ml Tubes	2 lbs. (0.9 kg)



Glassware Cap 7925408

Glassware Caps

Caps fit over Tubes described on page 18. Placing Caps on Tubes helps prevent cross contamination and moisture from condensing when using low boiling point solvents. Eight Polyethylene Glassware Caps are included with each RapidVap N₂ Evaporation System.

Catalog Number	Material	Description	Quantity per Package	Shipping Weight
7925500*	Polyethylene	Fits 600 ml Tube	1	0.5 lb. (0.2 kg)
7925408*	Teflon	Fits 600 ml Tube	8	0.5 lb. (0.2 kg)
7926808*	Teflon	Fits 170 ml Tube	8	0.5 lb. (0.2 kg)

* For use with RapidVap N₂ Evaporation Systems only.

Test results show that the **RapidVap Vacuum Evaporation System** produces excellent recoveries of a wide range of compounds.

Procedure: Samples consisting of a combination of several of the compounds listed below were prepared and each of the resulting compound mixtures was added to a separate 600 milliliter flat-bottom sample tube and placed in Sample Block 7494500 in the RapidVap 7900000. The following parameters were set: heat at 50° C, vortex speed at 28% of maximum, and vacuum of 250 mBar. The RapidVap was allowed to run continuously until the sample volume was reduced to 1 ml. A mass spectrometer was used to compare original compound amounts to the amounts detected in the reduced sample. Duplicates of the compound mixtures were tested and the percentages averaged.

BNAs

Compound	% Recovery
Acenaphthene	79
Acenaphthylene	80
Aniline	64
Anthracene	86
Azobenzene	84
Benzo(a)anthracene	82
Benzo(a)Pyrene	85
Benzo(b)Fluoranthene	84
Benzo(g,h,i)perylene	86
Benzo(k)Fluoranthene	87
Benzoic Acid	70
Benzyl Alcohol	73
Bis(2-Chloroethoxy) Methane	75
Bis(2-Chloroethyl) Ether	67
Bis(2-Chloroisopropyl) Ether	67
Bis(2-ethylhexyl)Phthalate	88
4-Bromophenyl Phenyl Ether	76
Butyl Benzyl Phthalate	85
4-Chloro-3-methylphenol	78
4-Chloroaniline	90
2-Chloronaphthalene	75
2-Chlorophenol	64
4-Chlorophenyl Phenyl Ether	80
Chrysene	86
Dalapon	58
Di-n-butyl Phthalate	86
Di-n-octyl Phthalate	89
Dibenzo(a,h)anthracene	84
Dibenzofuran	82
1,2-Dichlorobenzene	63
1,3-Dichlorobenzene	62
1,4-Dichlorobenzene	62
3,3'-Dichlorobenzidine	86
2,4-Dichlorophenol	72
Diethyl Phthalate	82
2,4-Dimethylphenol	68
Dimethylphthalate	79
4,6-Dinitro-2-methylphenol	81
2,4-Dinitrophenol	70
2,4-Dinitrotoluene	80
2,6-Dinitrotoluene	83
Fluoranthene	85
Fluorene	83
2-Fluorobiphenyl (SURR)	75
2-Fluorophenol (SURR)	46
Hexachlorobenzene	84
Hexachlorobutadiene	67
Hexachlorocyclopentadiene	58
Hexachloroethane	62
Indeno(1,2,3-cd)Pyrene	84
Isophorone	76
(3 & 4)-Methylphenol	73
2-Methylnaphthalene	78
2-Methylphenol	69
n-Nitroso-di-n-propylamine	90
N-Nitrosodimethylamine	63
N-Nitrosodiphenylamine	82
Naphthalene	71
2-Nitroaniline	79
3-Nitroaniline	86
4-Nitroaniline	82

BNAs (continued)

Compound	% Recovery
Nitrobenzene	67
Nitrobenzene-d5 (SURR)	62
2-Nitrophenol	69
4-Nitrophenol	87
p-Terphenyl-d14 (SURR)	84
Pentachlorophenol	71
Phenanthrene	86
Phenol	69
Phenol-d6 (SURR)	64
Pyrene	81
Pyridine	59
1,2,4-Trichlorobenzene	69
2,4,5-Trichlorophenol	75
2,4,6-Tribromophenol (SURR)	74
2,4,6-Trichlorophenol	76

CHLORINATED HERBICIDES (PHENOXY)

Analyte	% Recovery
Bentazon	95
Chloramben	116
2,4-D	94
2,4-DB	99
Dicamba	100
3,5-Dichlorobenzoic Acid	91
Dichloroprop	89
MCPA	80
MCPP	86
Pentachlorophenol	68
Picloram	106
2,4,5-T	118
2,4,5-TP (Silvex)	92
Tetrachloroterephthalic Acid	90

ORGANOPHOSPHOROUS PESTICIDES

Analyte	% Recovery
Bolstar	85
Chlorpyrifos	83
Coumaphos	90
Demeton, O & S	107
Diazinon	86
Dichlorvos	86
Dimethoate	123
Disulfoton	71
EPN	87
Ethoprosfos	89
Ethoprop	81
Ethyl Parathion	91
Fensulfothion	94
Fenthion	77
Malathion	87
Merphos	84
Methyl Azinphos	92
Methyl Parathion	85
Mevinphos	110

ORGANOPHOSPHOROUS PESTICIDES (continued)

Analyte	% Recovery
Monocrotophos	99
Naled	78
Phorate	75
Ronnell	79
Sulfotepp	82
TEPP	95
Tokuthion	79
Trichloronate	80

SEMIVOLATILE ORGANIC PESTICIDES

Analyte	% Recovery
Aldrin	83
alpha-BHC	88
beta-BHC	100
4,4'-DDD	87
4,4'-DDE	83
4,4'-DDT	93
delta-BHC	96
Dieldrin	83
Endosulfan I	75
Endosulfan II	84
Endosulfan sulfate	93
Endrin	90
Endrin Ketone	96
gamma-BHC (Lindane)	100
Heptachlor	83
Heptachlor epoxide	79
Methoxychlor	97

Testing conducted by
Keystone Laboratories, Inc.
Newton, Iowa

Test results show that the **RapidVap N₂ Evaporation System** produces excellent recoveries of a wide range of compounds.

Procedure: Samples consisting of a combination of several of the compounds listed below were prepared and each of the resulting compound mixtures was added to a separate 600 milliliter sample tube with 1.5 milliliter stems containing 300 ml methylene chloride and placed in the RapidVap 7910000. Sample tubes were not capped. The following parameters were set: heat at 40° C, vortex speed at 60% of maximum, and nitrogen pressure of 10 psi. The RapidVap was allowed to run continuously until the sample volumes were reduced to 1 ml. A mass spectrometer was used to compare original compound amounts to the amounts detected in the reduced samples. Duplicates of the compound mixtures were tested and the percentages averaged.

BNAs

Analyte	% Recovery
Acenaphthene	97
Acenaphthylene	92
Aniline	87
Anthracene	91
Azobenzene	83
Benzo(a)anthracene	97
Benzo(a)Pyrene	91
Benzo(b)Fluoranthene	96
Benzo(g,h,i)perylene	82
Benzo(k)Fluoranthene	100
Benzoic Acid	100
Benzyl Alcohol	80
Bis(2-Chloroethoxy) Methane	81
Bis(2-Chloroethyl) Ether	76
Bis(2-Chloroisopropyl) Ether	67
Bis(2-ethylhexyl)Phthalate	93
4-Bromophenyl Phenyl Ether	86
Butyl Benzyl Phthalate	94
4-Chloro-3-methylphenol	91
4-Chloroaniline	99
2-Chloronaphthalene	76
2-Chlorophenol	95
4-Chlorophenyl Phenyl Ether	82
Chrysene	96
Di-n-butyl Phthalate	87
Di-n-octyl Phthalate	90
Dibenzo(a,h)anthracene	92
Dibenzofuran	78
1,2-Dichlorobenzene	78
1,3-Dichlorobenzene	75
1,4-Dichlorobenzene	75
3,3'-Dichlorobenzidine	97
2,4-Dichlorophenol	97
Diethyl Phthalate	85
2,4-Dimethylphenol	100
Dimethylphthalate	80
4,6-Dinitro-2-methylphenol	100
2,4-Dinitrophenol	100
2,4-Dinitrotoluene	82
2,6-Dinitrotoluene	83
Fluoranthene	100
Fluorene	97
2-Fluorobiphenyl (SURR)	79
2-Fluorophenol (SURR)	77
Hexachlorobenzene	84
Hexachlorobutadiene	78
Hexachlorocyclopentadiene	73
Hexachloroethane	71
Indeno(1,2,3-cd)Pyrene	86
Isophorone	77
2-Methylnaphthalene	83
(3 & 4)-Methylphenol	100
2-Methylphenol	100
n-Nitroso-di-n-propylamine	73
N-Nitrosodimethylamine	83
N-Nitrosodiphenylamine	85
Naphthalene	94
2-Nitroaniline	85
3-Nitroaniline	92
4-Nitroaniline	95
Nitrobenzene	77
Nitrobenzene-d5 (SURR)	77

BNAs (continued)

Analyte	% Recovery
2-Nitrophenol	98
4-Nitrophenol	100
p-Terphenyl-d14 (SURR)	87
Pentachlorophenol	100
Phenanthrene	91
Phenol	95
Phenol-d6 (SURR)	76
Pyrene	96
Pyridine	6
2,4,6-Tribromophenol (SURR)	79
2,4,5-Trichlorophenol	94
2,4,6-Trichlorophenol	96

CHLORINATED HERBICIDES (PHENOXY)

Analyte	% Recovery
Acifluorfen	100
Bentazon	93
Chloramben	46
2,4-D	100
2,4-DB	93
Dicamba	87
3,5-Dichlorobenzoic Acid	83
Dichlorprop	82
4-Nitrophenol	100
MCPA	80
MCPP	78
Pentachlorophenol	82
2,4,5-T	78
2,4,5-TP (Silvex)	85

ORGANOPHOSPHOROUS PESTICIDES

Analyte	% Recovery
Bolstar	89
Chlorpyrifos	86
Coumaphos	98
Demeton, O & S	82
Diazinon	89
Dichlorvos	83
Disulfoton	72
EPN	88
Ethoprop	88
Ethyl Parathion	86
Fensulfthion	100
Fenthion	89
Malathion	92
Merphos	93
Methyl Azinphos	99
Methyl Parathion	84
Mevinphos	88
Monocrotophos	82
Naled	83
Phorate	79
Ronnel	85
TEPP	59
Tokuthion	88
Trichloronate	85

SEMIVOLATILE ORGANIC PESTICIDES

Analyte	% Recovery
Aldrin	84
alpha-BHC	88
beta-BHC	86
4,4'-DDD	90
4,4'-DDE	86
4,4'-DDT	96
delta-BHC	92
Dieldrin	87
Endosulfan I	92
Endosulfan II	93
Endosulfan sulfate	87
Endrin	92
gamma-BHC (Lindane)	84
Heptachlor	84
Heptachlor epoxide	92
Methoxychlor	96

Testing conducted by
Keystone Laboratories, Inc.
Newton, Iowa

Tests results show that the **RapidVap N₂/48 Evaporation System** produces excellent recoveries of a wide range of analytes. Carryover from one tube to another was not detectable.

Procedure: Samples consisting of a combination of several of the analytes listed below were prepared and each of the resulting analyte mixtures was added to a separate 20 mm sample tube containing 10 ml methylene chloride and placed in the RapidVap N₂/48 7910012. The following parameters were set: heat at 40° C, vortex speed at 100% of maximum, and nitrogen pressure of 15 psi. The RapidVap was allowed to run continuously until the sample volumes were reduced to 1 ml. A mass spectrometer was used to compare original compound amounts to the amounts detected in the reduced samples. Duplicates of the analyte mixtures were tested and the percentages averaged.

BNAs

Analyte	% Recovery
1,2,4-Trichlorobenzene	86.3%
1,2-Dichlorobenzene	78.7%
1,3-Dichlorobenzene	78.2%
1,4-Dichlorobenzene	78.6%
2,4,5-Trichlorophenol	95.5%
2,4,6-Tribromophenol (SURR)	92.6%
2,4,6-Trichlorophenol	92.5%
2,4-Dichlorophenol	89.1%
2,4-Dimethylphenol	89.6%
2,4-Dinitrophenol	89.3%
2,4-Dinitrotoluene	96.7%
2,6-Dinitrotoluene	96.9%
2-Chloronaphthalene	94.1%
2-Chlorophenol	82.2%
2-Fluorobiphenyl (SURR)	93.5%
2-Fluorophenol (SURR)	78.1%
2-Methylnaphthalene	92.6%
2-Methylphenol	88.9%
2-Nitroaniline	95.5%
2-Nitrophenol	87.9%
3 & 4-Methylphenol	88.5%
3,3-Dichlorobenzidine	100.0%
3-Nitroaniline	100.0%
4,6-Dinitro-2-Methylphenol	94.4%
4-Bromophenyl Phenyl Ether	96.4%
4-Chloro-3-Methylphenol	95.5%
4-Chloroaniline	98.7%
4-Chlorophenyl-Phenyl Ether	96.3%
4-Nitroaniline	100.0%
4-Nitrophenol	95.5%
Acenaphthene	95.6%
Acenaphthylene	96.8%
Aniline	88.8%
Anthracene	96.1%
Azobenzene	94.2%
Benzidine	96.0%
Benzo(a) Pyrene	95.1%
Benzo(a) Anthracene	97.7%
Benzo(b) Fluoranthene	96.4%
Benzo(g,h,i) Perylene	88.3%
Benzo(k) Fluoranthene	95.8%
Benzoic Acid	87.2%
Benzyl Alcohol	91.5%
Bis-(2-Chloroethoxy) Methane	92.5%
Bis(2-Chloroethyl) Ether	83.2%
Bis(2-Chloroisopropyl) Ether	84.6%
Bis(2-Ethylhexyl) Phthalate	97.8%
Butyl Benzyl Phthalate	97.7%
Carbazole	100.0%
Chrysene	99.0%
Dibenzo(a,h) Anthracene	88.2%

BNAs (continued)

Analyte	% Recovery
Dibenzofuran	95.0%
Diethyl Phthalate	96.7%
Dimethyl Phthalate	96.5%
Di-n-butyl Phthalate	98.4%
Di-n-octyl Phthalate	95.9%
Fluoranthene	98.1%
Fluorene	96.7%
Hexachlorobenzene	95.9%
Hexachlorobutadiene	84.0%
Hexachlorocyclopentadiene	90.3%
Hexachloroethane	80.2%
Indeno(1,2,3-cd) Pyrene	87.9%
Isophorone	94.7%
Naphthalene	88.7%
Nitrobenzene	87.9%
Nitrobenzene-d5 (SURR)	87.8%
N-Nitrosodimethylamine	75.9%
N-Nitroso-Di-n-propylamine	91.7%
N-Nitrosodiphenylamine	100.0%
Pentachlorophenol	93.7%
Phenanthrene	96.9%
Phenol	84.5%
Phenol-d6 (SURR)	87.3%
p-Terphenyl-d14 (SURR)	98.1%
Pyrene	96.9%
Pyridine	74.5%

**CHLORINATED
HERBICIDES (PHENOXYs)**

Analyte	% Recovery
2,4,5-T	100%
2,4-D	100%
2,4-DB	53%
3,5-Dichlorobenzoic Acid	100%
4-Nitrophenol	70%
Acifluorfen	100%
Bentazon	100%
Chloramben	100%
Dalapon	89%
Dicamba	100%
Dichloroprop	100%
Dinoseb	100%
MCPA	100%
MCPP	100%
Pentachlorophenol	100%
Picloram	96%
Silvex	100%

**ORGANOPHOSPHOROUS
PESTICIDES**

Analyte	% Recovery
Chlorpyrifos	98.6%
Coumaphos	99.8%
Demeton	90.7%
Diazinon	97.4%
Dichlorvos	94.2%
Disulfoton	99.9%
EPN	94.8%
Ethoprop	98.8%
Fensulfothion	75.9%
Fenthion	97.8%
Malathion	89.2%
Merphos	95.5%
Methyl Parathion	100.0%
Mevinphos	94.8%
Monocrotophos	87.9%
Naled	99.9%
Phorate	98.4%
Ronnel	98.0%
TEPP	63.4%
Tokuthion	100.0%
Trichloronate	98.1%

**SEMIVOLATILE ORGANIC
PESTICIDES**

Analyte	% Recovery
4,4-DDD	95.7%
4,4-DDE	97.3%
4,4-DDT	99.7%
Aldrin	97.9%
alpha-BHC	97.4%
beta-BHC	98.1%
delta-BHC	96.8%
Dieldrin	96.3%
Endosulfan I	97.0%
Endosulfan II	98.7%
Endosulfan Sulfate	99.6%
Endrin	99.0%
Endrin Aldehyde	97.0%
Endrin Ketone	98.0%
gamma-BHC	96.1%
Heptachlor	97.5%
Heptachlor Epoxide	99.4%
Methoxychlor	96.6%

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