ASE® 200
ACCELERATED
SOLVENT EXTRACTOR

IT'S TIME TO ACCELERATE

Get Up to Speed

DIONEX

It's Time to Accelerate.

Extractions that normally take hours can be done in minutes using Accelerated Solvent Extraction. Compared to techniques like Soxhlet and sonication, ASE generates results in a fraction of the time. If your extractions take more than 15 minutes—"It's Time to Accelerate" with ASE.

In addition to speed, the ASE 200 delivers unparalleled labor savings. It can extract up to 24 samples, unattended, and deliver filtered extracts, ready for cleanup and analysis.

Programming capabilities of the system allow you to quickly re-extract samples to confirm extraction efficiency and validate the method. Difficult extractions can be completed by programming multiple extraction cycles of a single sample.

The Solvent Controller can be used to automatically mix and deliver solvents to reduce labor and solvent exposure. Additionally, samples can be extracted with different solvent polarities to achieve alternative extraction selectivity.

When used in conjunction with the AutoASE™ software, the ASE 200 becomes an even more powerful solvent extraction workstation. AutoASE stores and tracks sample information electronically for accurate reporting and storage. Speed up your extractions with the automation capabilities and technology of ASE.

Get Up to Speed

Rapid Extractions in Less Than 15 Minutes

Sample analysis techniques have advanced rapidly to improve laboratory speed and throughput. Unfortunately, sample extraction can still take hours or days to complete. Traditional techniques, like Soxhlet can take 4–48 hours. With ASE you can achieve analyte recoveries equivalent to those obtained using traditional extraction methods in only 15 minutes. Rapid extractions can now be a part of your productive lab.

ASE Saves Solvent, Time & Money

	Average Solvent Used per Sample	Average Extraction Time per Sample	Average Cost per Sample *
Soxhlet	200–500 mL	4–48 hr	$27
Automated Soxhlet	50–100mL	1–4 hr	$16
Sonication	100–300 mL	30 min–1hr	$24
SFE	8–50 mL	30 min–2 hr	$23
ASE	15–40 mL	12–18 min	$14

*Based on 2000 samples per year. Costs (in U.S. dollars) are based on appropriate instrumentation per technique (including amortization of initial capital investment), apparatus, laboratory equipment (e.g., fume hood), labor, and all consumables.

Economical Operation

ASE offers a lower cost per sample than other extraction techniques. Compared to other techniques, ASE cuts solvent consumption by up to 95%. Only 15 mL of solvent is required for a 10-gram sample. Less solvent means less expense, and ultimately a lower cost per sample. Because so little solvent is used, final clean-up and concentration is fast and easy. Which saves additional time and money.

Reduced Exposure to Solvents

Reduce solvent exposure with the ASE 200. Solvents are stored in a self-contained unit and delivered automatically. This limits the amount of time chemists are exposed to potentially dangerous vapors. It also limits glassware handling, and facilitates a safe laboratory working environment.

Easy Start-up Using Your Current Methods

Operation of the ASE 200 is so straightforward and easy, you can plan on extracting samples minutes after your unit is installed. Start by using the same solvent specified by your existing method—often it will provide equivalent recoveries on the first attempt. The ASE 200 uses many of the same solvents you are already using, so method development time is minimal. Sample preparation is also the same for ASE as for other extraction techniques.

Unlike other extraction techniques, ASE independently controls temperature and pressure conditions for each sample cell. This control is critical for high analyte recovery and reproducibility, even with samples that contain varying amounts of moisture.

Easy Method Development

Need to develop a method for a new sample matrix? Use ASE. Approximately 70–80% of all ASE extractions are completed in less than 15 minutes using the standard ASE extraction conditions (100 ˚C, 1500 psi). Method development starts with these conditions. If these initial parameters don't provide the recoveries desired, simply increase the temperature to improve the efficiency of the extraction. Adding static cycles, increasing static time, and selecting a different solvent are additional variables that can be used to optimize a method. The simple development steps of the ASE technology make method development fast, easy, and automated.

Easily Validate the Method

Automation capabilities combined with the speed of extraction make it easy to validate a method using the ASE 200. Just program the schedule to extract the sample two to three times, into separate vials, analyze each vial for analyte content, and adjust the method parameters accordingly. It is often possible to transfer a method to ASE and validate the same day.

Used to Develop U.S. EPA Method 3545

ASE is accepted for use in U.S. EPA SW-846 Method 3545, which can be used in place of Methods 3540, 3541 and 8151. The ASE 200 was the only system used to develop and validate this methodology. Method 3545 can be applied to the extraction of base/neutrals and acids (BNAs), chlorinated pesticides and herbicides, polychlorinated biphenyls (PCBs), organophosphorus pesticides, total petroleum hydrocarbons, and dioxins and furans.

Take a Closer Look at ASE.

What is ASE?

Accelerated Solvent Extraction is an automated technique for extracting solid and semisolid samples with liquid, organic or aqueous solvents. The ASE 200 uses patented* technologies that accelerate the extraction of analytes from samples. Common solvents are used at elevated temperatures and pressures to increase the speed and efficiency of the extraction process.

*U.S. patent numbers: 5,843,311; 5,647,976; 5,660,727; and 5,785,856

The benefits of using elevated temperature and pressure are:

Accelerated Extraction Kinetics with Elevated Temperature

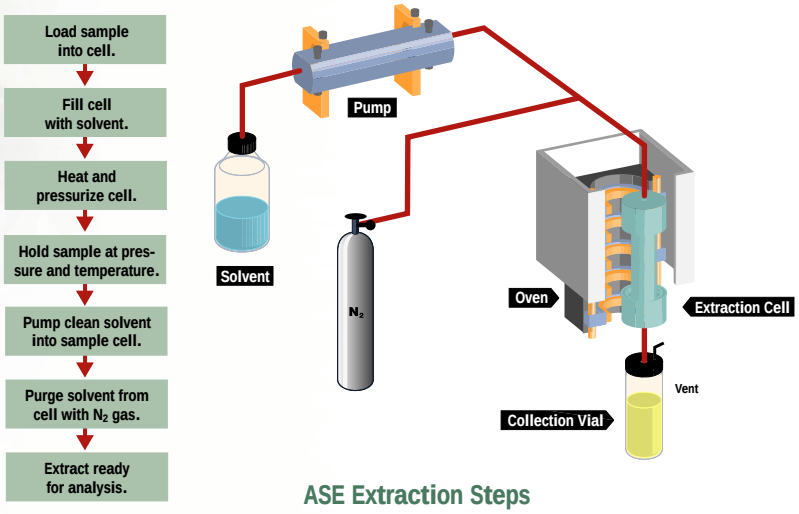
- Higher analyte solubility
- Helps overcome matrix effects
- Faster desorption kinetics
- Lower solvent viscosity
- Efficient diffusion into matrix

Efficient Extractions with Elevated Pressure

- Keeps solvents liquid at temperatures above their boiling points
- Helps fill cells rapidly

Designed for Safety

The system incorporates multiple safety features to eliminate potential hazards. Sensors for temperature, pressure, or solvent leaks alert the operator to a problem by sounding an alarm, and if necessary shutting down the system.



ASE Extraction Steps

Prepared samples are loaded into the fingertight, stainless steel extraction cells and placed on the cell carousel. The carousel rotates the sample cell into position for transfer to the oven chamber. The cell is then transferred to the oven and automatically sealed under pressure. The cell is then filled with solvent, heated and pressurized. After the cell reaches the set temperature, it is held in the oven, at constant temperature and pressure, for a user-set static time. The analyte and solvent are collected in the vial, and the cell is then flushed, and purged by nitrogen gas. Once complete, the cell is returned to the carousel and the next sample is extracted.

Broad Application Use

The ASE 200 Accelerated Solvent Extractor provides rapid and automated extraction of target
Some of the proven applications and their recoveries are presented below.

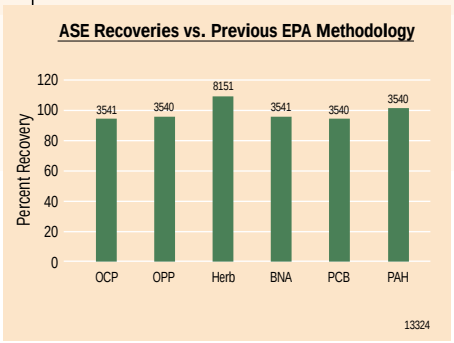
Environmental

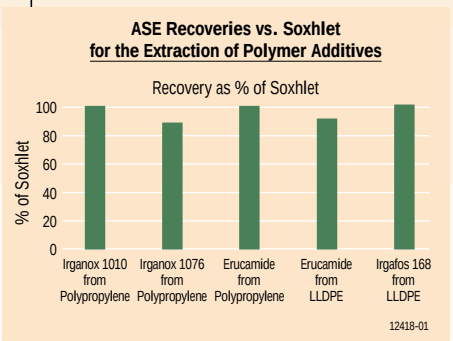
Extraction of environmental contaminants from soil, sludges and sediments as documented in U.S. EPA Method 3545 for the following analyte classes:

- Organochlorine and Organophosphorous pesticides (OCP, OPP)
- Base / Neutral and Acid compounds
- Chlorinated herbicides
- Polychlorinated Biphenyls (PCB)
- Dioxins and Furans
- Total Petroleum Hydrocarbons

Polymers

- Antioxidant additives from polyolefins
- Plasticizers from PVC
- Hexane extractables
- SBR and EPDM extractions





Enhance the performance of the ASE 200 with the Solvent Controller and AutoASE computer control software. Automatically mix and change solvents between extractions with the solvent controller and store and track sample information with AutoASE. Expand your ASE 200 reporting and control capabilities with these two additional automation modules.

analytes from a broad range of solid and semi-solid samples.

Pharmaceuticals

- Additives from animal feeds
- Active compounds from pills, preps, and patches
- Natural products and nutriceuticals

ASE Recoveries vs. Sonication for the Extraction of Nitroglycerin from Transdermal Patches

	10 cm^2 patch	20 cm^2 patch
Drug Extracted (mg/patch)	31.4	62.0
Recovery (as % of sonication)	99.1%	96.0%
RSD (n=10)	1.4%	3.9%
Sonication RSD	1.5%	1.1%

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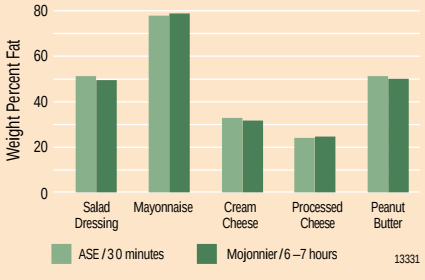
Food

These same contaminants can be automatically extracted from food and animal tissue in minutes, rather than hours.

- Fat in meat products
- Free fat in snack food products
- Total fat in dairy products

ASE Recoveries vs. Mojonnier for Fat Extraction

High Fat Content Foods (Gravimetric)



Change and Mix Solvents Automatically.

Automate Your Solvent Delivery
With the Solvent Controller, up to four solvents can be mixed and delivered to the ASE 200. Four 1- or 2-L solvent bottles, capable of mixing solvents in 5% increments, are stored in a convenient caddie designed to direct solvent spills to waste. This unique design decreases the amount of time you spend on laborious tasks like measuring and mixing solvents and reduces errors. Low solvent consumption, fast run times, and the ability to automatically change solvents between extraction runs make the ASE 200 with the Solvent Controller an optimum choice for enhanced sample extractions.

Effortless Routine Analysis
The solvent controller makes the task of extracting various analytes seem routine. For example, the system can run 6 PCB samples, then 6 PAH samples, automatically changing the solvent for the new analyte class. The system can also be programmed to rinse with a different solvent or solvent mixture than you are using for extraction.

Systematic Method Development
Unsure of what solvent will achieve the best extraction efficiency for your analysis? Automate the development process with the capability of selecting different solvents for your sample matrix. The Solvent Controller provides the flexibility to automatically program extractions with different solvents or solvent mixtures for simplified method development.

Automated Extraction Selectivity
Using the Solvent Controller you can automate the selectivity of your extraction. Samples can be re-extracted with different solvent polarities to achieve alternative extraction selectivity.

Reduced Solvent Exposure
The Solvent Controller's ability to mix solvents protects you against unnecessary solvent exposure. For example, you can reduce the exposure to solvents by pre-programming the system to mix solvents like Hexane/Acetone for Organochlorine pesticide extraction.

Controller

Program and Control Sample Results.

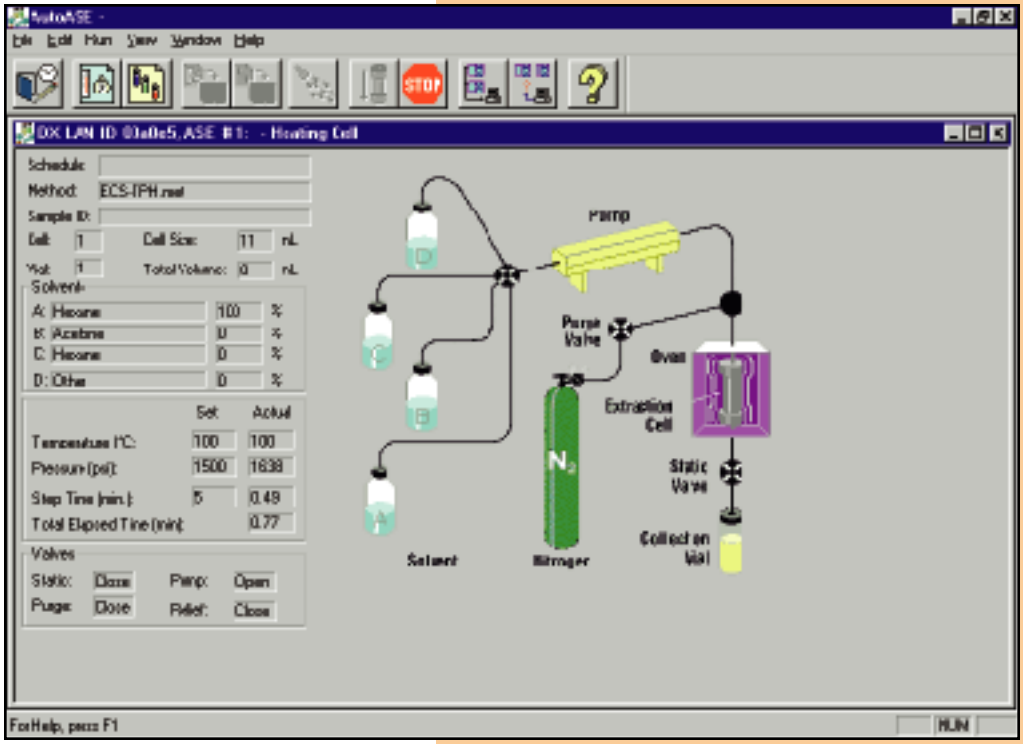
AutoASE is a control and reporting software application for the ASE 200. GLP compliance is easy with the ability to electronically store and track sample identification, methods, and schedules. Run up to eight ASE systems, and keep track of all samples and solvents from one AutoASE location. Program and control your extraction results with the advanced automation capabilities provided by AutoASE.

Accurate Reporting and Storage

- Track and printout sample information
- Monitor ASE 200 operation continuously
- Store and track sample information electronically
- Save unlimited methods and schedules
- Identify samples with text and numeric descriptors
- Monitor and track samples run on multiple systems with reporting capabilities

Operating Control

- Operate with variable rinse volumes
- Access ASE 200 control functions quickly with a user-friendly icon bar
- Control or monitor up to 8 ASE systems from one PC
- Bar code readers can be used



The AutoASE Main Screen displays current operating information, such as cell size, total solvent volume, solvents used, and actual temperatures and pressures. The graphical display shows the operator what steps the ASE 200 is performing. For example, solvent lines light up and an oven radiates when in use.

Method Editor Screen
Create, review, and edit new or existing methods with the method editor screen.

Schedule Editor Screen
Schedule extraction conditions for a series of extractions and control variable rinse volumes.

Operating Status Screen
All of the operating details of a method, including a graphical display of the current status and detailed information on operating parameters, can be viewed on this screen.

Automation

ASE SYSTEM SPECIFICATIONS

ASE 200 ACCELERATED SOLVENT EXTRACTOR

Oven:
- Accepts 1, 5, 11, 22, and 33 mL (internal volume) size cells
- Auto-seal actuator places cell into oven and returns cell to tray after extraction
- Temperature control up to 200 °C
- Vertical cell orientation with flow from top to bottom

Pump:
- Fluid delivery pressure up to 20 Mpa (3000 psi)
- Automatic pressure sensor and pressure relief during heat-up

Fluid Sensors:
- IR sensors detect the arrival of fluid into the collection vial and fluid levels during extract collection

Display and Keyboard:
- Menu operated
- LCD 7 x 40 character display
- Method and schedule editor
- Method and schedule storage

Extraction Cells:
- 1, 5, 11, 22, and 33 mL size cells
- Internal cell diameter: 5.8, 12.94, and 19.1 mm
- Hand-tight cell caps with compression seal for high-pressure closure

Extraction Cell Tray:
- 24 cell positions
- 4 rinse positions
- Automatic home position sensing
- Multiple extractions per cell

Collection Vial Tray:
- Removable vial tray
- 26 vial positions plus 4 vial positions for rinse/waste collection
- Tray compatible with 40 mL or 60 mL vials

Collection Vials:
- Two standard vial sizes, 40 or 60 mL
- Vial lids with solvent-resistant septa (TFE-coated on solvent side)
- Graduated concentration vial: 40 mL

Extraction Fluids:
- Compatible with a wide range of organic and aqueous-based solvents

Dimensions: (h x w x d):
- 59.4 cm x 58.8 cm x 60.4 cm (23.4 in x 23.1 in x 23.8 in)

Weight:
- 71.6 kg (156 lbs)

Power Requirements:
- Consumption: 500–VA (watts) max.
- Voltage: 100–240 V ac, 50–60Hz

Pneumatic Requirements:
- Air at 400–827 kPa (60–120 psi)
- N_2 at 1034–1340 kPa (150–200 psi)

AutoASE COMPUTER CONTROL SOFTWARE

System Requirements:
- Pentium®-based PC with one open PCI slot
- Windows® 95
- 3.5-in. high-density disk drive

ASE 200 SOLVENT CONTROLLER

Dimensions: (h x w x d)
- 35.6 cm x 20.3 cm x 49.8 cm (14.0 in x 8.0 in x 19.6 in)

Weight:
- 4.5 kg (10 lbs.)

ASE 200 Firmware (Required):
- FW 2.01 or higher
- BIOS 3.00 or higher

Power Requirements:
- Provided via cable from the ASE 200

PART NUMBERS

ASE 200 ACCELERATED SOLVENT EXTRACTOR

- ASE 200 with 11 mL extraction cells..... P/N 47004
- ASE 200 with 22 mL extraction cells..... P/N 47005
- ASE 200 with 33 mL extraction cells..... P/N 47006
- ASE 200 with 11 mL extraction cells, Solvent Controller, and AutoASE software package..... P/N 52597
- ASE 200 with 22 mL extraction cells, Solvent Controller, and AutoASE software package..... P/N 52598
- ASE 200 with 33 mL extraction cells, Solvent Controller, and AutoASE software package..... P/N 52599
  (NOTE: The ASE 200 includes one solvent bottle. Additional bottles can be ordered using the part number below.)
- Bottles Package, 2L, set of three..... P/N 53848
  (includes caps with tube assemblies)

ASE 200 SOLVENT CONTROLLER

- Solvent Controller.....P/N 51987
  (includes connecting cables and fluid lines, bottles must be ordered separately)
  (NOTE: Use this part number for Solvent Controllers ordered with an ASE 200 for factory installation or for ASE 200 extractors with serial numbers starting from 97050396.)
- Solvent Controller with Kit for Field Installation..... P/N 51995
  (includes connecting cables, fluid lines, and CPU card)
  (NOTE: Use with ASE 200 extractors with serial numbers up to 97050395)
- Bottles Package, 2L, set of three..... P/N 53848
  (includes caps with tube assemblies)
- ASE Solvent Controller Package.....P/N 52577
  (includes Solvent Controller, AutoASE software, four 2L bottles, and cap assemblies)

AutoASE COMPUTER CONTROL SOFTWARE

- AutoASE .....P/N 52340
  (includes software, moduleware, 2 LAN cards, cable, and connectors)

DIONEX

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For More Information

For more information, contact your local Dionex representative at one of our worldwide offices. Your Dionex representative can help you select the system and accessories that best fit your extraction needs.

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