CDS Analytical

Leaders In Sample Introduction Technology

Dynatherm Thermal Desorption Systems

A complete suite of sample collection and concentration systems

FAST

RELIABLE

FLEXIBLE

UPGRADEABLE

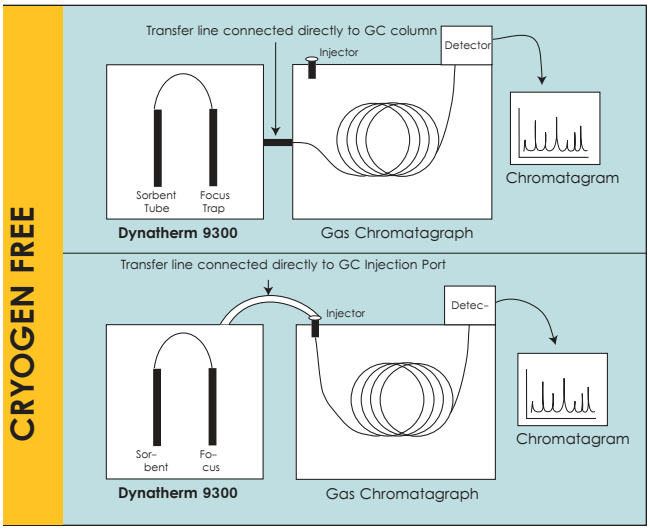
CDS Analytical is the premier designer and manufacturer of laboratory instruments for sample introduction to GC for analysis. For over 35 years our focus has been on conceiving, designing, manufacturing, and supporting leading edge instrumentation.

Today we offer a complete suite of diverse front-end GC equipment for pyrolysis, purge and trap, headspace, and thermal desorption. These robust, field-tested products provide the entire range of sample introduction techniques, and matrix handling capabilities utilizing different; gas flows, temperatures, heating rates, and multiple step capabilities required by today's most demanding analytical laboratories.

Dynatherm thermal desorption systems are the name brand in the chemical weapons industry, known and respected for flexibility and reliability. Time and again, organizations like the U.S. Department of Defense, State DOH Labs, mobile labs and major universities have relied on them in situations where there simply is no margin for error.

Our new Series 9300 thermal desorbers include: a single tube desorber, a near real-time sampling system, a continuous sampler, and the only autosampler able to handle any standard size thermal desorption tubes.

In years to come CDS Analytical will continue to support customers by developing the next generation of sample introduction instrumentation.



Thermal Desorption

Thermal desorption is a two step technique. First, samples are collected and concentrated. Next, they are transferred to a detector for analysis.

Dynatherm instruments capture relevant compounds on adsorbent material packed in glass cartridges (sorbent tubes). Then they introduce the collected chemicals into a gas chromatograph, where the components are separated, identified, and measured.

Thermal desorption uses heat, not solvent extraction, to release organic compounds. This eliminates long extraction waits and interference from solvent peaks.

Two sorbent tubes work in tandem: a high capacity tube retains desired compounds from large sampling volumes; a capillary bore focusing trap injects samples onto the capillary column in a narrow band.

Transferring analytes to the focus trap improves injection efficiency without the need for cryogenics or peltier cooling. This is because the sampling process may have required liters of flow to collect mass sufficient to meet the analytical needs. The method also minimizes water interference because carrier gas evaporates water vapor from the sorbent tube and vents it from the unit with no sample loss.

Dynatherm instruments are perfect for a mobile laboratory. Samples can be collected using a battery powered unit for remote air sampling and brought to the lab, or collected directly onto the unit utilizing a heated sampling line.

Applications

What We Can Measure

Air, solids and even liquids for:

- Any C_2 up to C_{33}; 5 ring PAH's maximum
- Halogenated C_1–C_{33} compounds
- High moisture samples are OK
- Levels from ppt (parts per trillion) to %

Military and Homeland Security

Analysis of:

- Chemical agents
- NTA
- WMD
- TICS
- TIMS

Environmental

- TO–1, TO–2, TO–17 Using any standard size tube.
- VOST – Volatile Organic Sampling Train
- IH – Industrial hygiene samples
- ASTM method D6196
- MDHS method 72
- NIOSH method 2459
- Soil, water for volatile organics

Indoor Air Quality

Product Emissions:

- Carpets
- Adhesives
- Upholstery
- Vehicle trim and interior
- Textiles
- Construction and building materials

Food, Flavors and Fragrances

- Aroma compounds collected from headspace
- Analysis of flavor compounds using solid thermal desorption, SPE or SBSE
- Pharmaceutical powders and ointments

ACEM 9300/9305/9350 Thermal Desorption System

System Application

- **9300** – Single tube thermal desorber
- **9305** – Near real time sampling and thermal desorption
- **9350** – Continuous air monitoring, single or dual tube desorption, soils and water analysis

Current Users

- U.S. and Russian Military
- Chemical weapons monitoring and destruction facilities worldwide
- State and federal mobile laboratories
- Universities
- Research and development laboratories
- QA/QC laboratories

Functional Profile

This flexible and reliable series of instruments are the next iteration of the familiar ACEM 900 which has proven itself repeatedly in Defense Department depots storing and destroying chemical agents around the world.

The 9300 Thermal Desorption system is typically attached to a GC or GC/MS to provide extreme sensitivity by concentrating air samples for minutes to hours. The 9305 and 9350 provide near real time sampling and continuous monitoring capabilities respectively utilizing a heated sampling line, mass flow controller and vacuum pump.

Other applications include characterizing source emissions, quantifying increasingly lower levels of contamination during site remediation projects, and identifying health hazards in the work place or to emergency response crews in the event of a chemical spill or terrorist activity.

Using high capacity sampling tubes, the 9300 Thermal Desorption System captures and desorbs target analytes to the GC and GC/MS. The analytes are focused on a precision bore focus trap, resulting in a narrow band injection without splitting, sub ambient cooling, or cryofocusing.

This two stage trapping and desorption process provides the most efficient capture and release of airborne contaminants possible within a field operable system.

Built–In Flexibility

Building on the success of the 900 series Automated Concentrator for Environmental Matrices (ACEM), the 9300 series offers multiple configurations of the basic thermal desorber to provide maximum flexibility. All versions include sorbent tube chambers that accept 6, 8 or 10 mm OD tubes, concentrate the analytes of interest on the capillary bore focus trap and connect to the GC by direct connection to the GC column, or by connecting through the injection port.

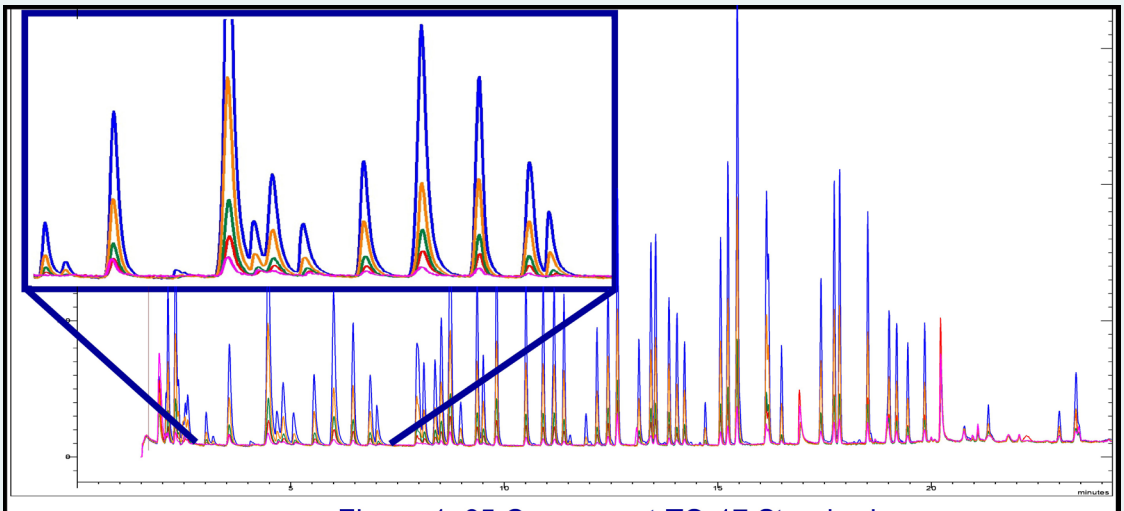
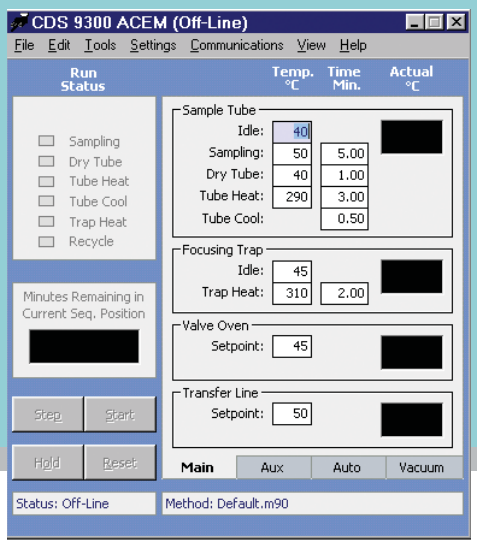


Figure 1: 65 Component TO-17 Standard
5ppbv through 100ppbv (Dichlorofluoromethane – Hexachlorobutadiene)

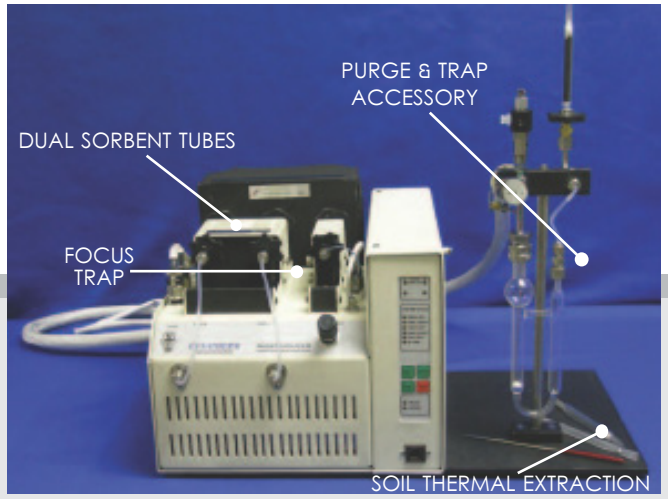
9300/9305/9350
Product Specifications



All models feature electronic control with a handheld plug–in for system maintenance and direct communication interface for PC control. Computer controls allow users to save and recall methods, preset maximums for identified tubes and traps, run different tubes with different methods or the same tube multiple times. Log files are generated that include analyst, date/time of injection, method, start temperatures, and leak check verification. The flexible transfer line, reinforced with a Silconert™ liner, provides direct connection to GC column for maximum sensitivity, or connection to the GC inlet for use with the GCs split features. All systems have a dynamic range of C_2–C_{33}+, including volatiles, semi volatiles, polar and nonpolar compounds. Heating rates of 1000°C/min. for sample tubes and 900°C/min for focus traps. Systems include sorbent tube maintenance counters on all valves and various timed event capabilities.

	9300	9305 NRT	9350 Series
Desorb a single tube	•	•	•
Focus Traps (no cooling required)	•	•	•
Near Real Time Sampling capabilities (Single Tube)		•	•
Use GC Carrier Gas	•	•	•
Unique Pre–desorb capability eliminates need for trap cooling	•	•	•
Control of 4 Heated Zones from ambient to 350°C	•	•	•
Ability to analyze 6mm, 8mm or 10mm (6mm end) tubes	•	•	•
Interface to any GC	•	•	•
Continuous sampling capabilities			•
Mass Flow Controller		•	•
Soil desorption capabilites	•	•	•
Water Purge & Trap Accessory		•	•

ACEM 9350 Continuous Sampling Thermal Desorption System



Thermal desorption is frequently employed for sample introduction in routine air monitoring applications, as well as mission critical situations like monitoring health and safety in highly dangerous venues. Thermal desorption can also be found in government facilities monitoring for chemical agents, and in industrial facilities detecting toxic industrial chemicals (TICS) and ozone precursors.

The CDS 9350, our latest real time air monitoring system, is designed to deliver the functionality of thermal desorption to applications so demanding heretofore they were way out of reach. This includes the ability to collect and analyze compounds with boiling points as low as –50°C, (without cryogen trapping or Peltier cooling). Users can also collect analytes with boiling points as high as 300°C using a heated sampling line, (all heated zones are capable of maintaining temperatures up to 350°C.)

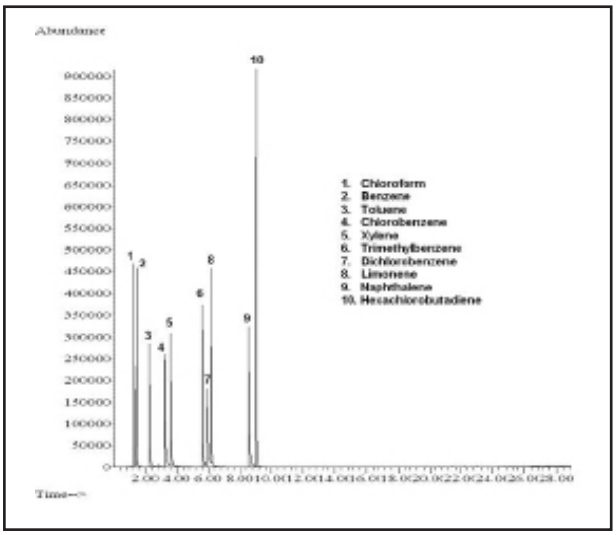
The CDS 9350 has fast flow capabilities for sample collection of up to 1.5 L/min and offers rapid heating and cool-down times for sorbent tubes and focus trap, without the need for cryo focusing or peltier cooling. This capability allows for much faster collection–to–analysis cycles when used in conjunction with the latest in low thermal mass (LTM) chromatography techniques.

ACEM 9350 Specifications

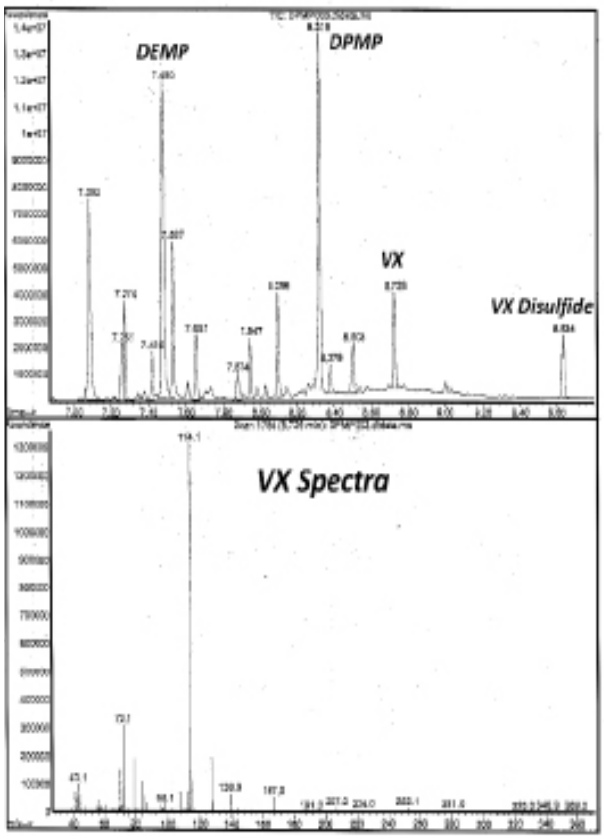
Compatible with all GC and GC/MS makes and models

- Dual sorbent tubes for continuous sampling
- Single focus trap
- Desorption temperatures up to 375°C (sorbent limited)
- Valve and transfer line temperatures up to 350°C
- Heating rates: 1000°C/min (typical)
- Sorbent tubes: Standard – 6 mm OD x 4 ½" (114mm) Length, Fast flow – 10 mm OD x 4 ½" (114mm) length (6mm ends)

GC Volatiles Utilizing the Purge & Trap Accessory



9350 VX in Air



(Chromatogram courtesy of U.S. Army Research, Development and Engineering Command, ECBC)

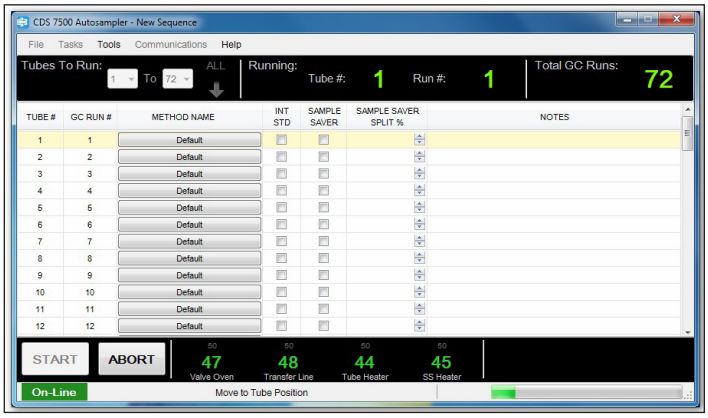
CDS – 7500 Thermal Desorption Autosampler

As an extension to our thermal desorption product line and our popular 7400 Purge & Trap Autosampler, the NEW CDS 7500 TD Autosampler offers several unique innovations in thermal desorption analysis. The CDS–7500 is a 72 position TD autosampler with chemically inert sample pathways made of PEEK®, and Silconert®, using a reliable pick and place robotic arm to move the samples into the desorption interface. The Autosampler includes automated IS addition, sample saver and leak checking.

But the flexibility begins with its ability to connect to different front–end concentrators such as the CDS–7000 Purge and Trap Concentrator, CDS–Dynatherm 9300 and even PT systems from OI and Tekmar.

The 7500 Autosampler has the unique ability to change between thermal desorption tubes for air analysis and VOA vials for soil and/or water analysis. By easily changing out the sampling tower, the user can rapidly change the autosampler from an air sampling system to a water/soil purge and trap system while using the same concentrator.

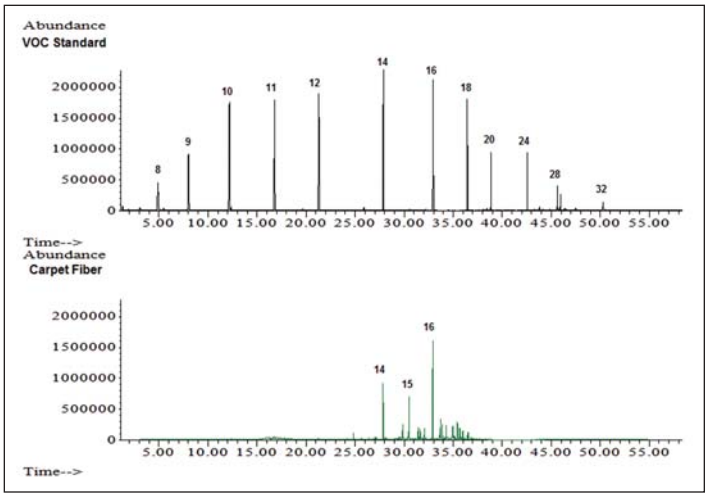
- Tray Capacity: 72 Samples
- Pick & Place Robotic Arm
- Automatic Leak Checking
- Internal Standard Addition
- Sample Saver Option
- Can handle any "Standard" sorbent tube size (3 ½"L x ¼" OD or 4 ½" L x 6mm OD)
- Heating rate for desorption 900°C/min up to a maximum desorption temperature of 350°C
- Stand–alone software control. Communicates directly with the sample concentrator.
- Run samples multiple times, add internal standards, enter sample saver splits for any sample.



The unit requires:

- Sample Concentration System: Connected through GC injection port or direct to the analytical column. CDS–9300, CDS–7000, or any Commercial Purge & Trap Concentrator

- A computer with Windows XP (SP3) and higher operating systems.



Automobile Interior Emissions Using VOC Portion of VDA 278 (8–32 straight chain alkanes by carbon number)

Accessories

Sorbent Tubes and Focus Traps

Single Tube Conditioner

6–Tube Conditioner

Model 1067

Model 2012

Sorbent Tubes and Focus Traps

The design of the sorbent tubes and focus traps used for sample collection and thermal desorption in Dynatherm systems is a major factor contributing to the overall performance of the equipment. Dynatherm sorbent tubes are precisely engineered to snugly fit into Vespel Graphite ferrules, offering a balance between elasticity (seal in a pressurized environment) and durability (resist deforming under pressure). The 1 mm tube wall thickness is rugged and robust.

- Standard Sorbent Tubes: 6 mm OD, 4½" (114mm) long
- Fast Flow Tubes: 10 mm OD, 4½" (114mm) long with 6 mm ends.
- Focus Traps: 6 mm OD, 4½" (114mm) long with 0.9 mm – 0.2 mm ID.
  or 1/8" (3.18mm) Stainless Steel

For a complete list of tubes and packings visit our website www.cdsanalytical.com/products/tubes.htm

Tube Conditioners

Dynatherm offers two conditioners to restore tubes to their original purity, a single tube model (Model 10) and a six tube model (Model 9600). The six tube model is sensor controlled to 1°C and features individualized temperature and flow control for each tube.

Heaters and fittings can be mixed and matched to accommodate tubes with varying outer diameters and lengths.

The 9600 comes with a handheld controller, which stores up to 20 methods, and optional DCI software, letting the user program each tube chamber in 1°C increments and condition in 0.1 minute increments.

Both models offer an injection port option that lets users spike tubes with an internal standard, or other reference materials.

Remote Sampling Accessories

The Model 1067 (2 channel) and Model 2012 (4 Channel) Air Samplers were developed for easy, flexible sampling of multiple sorbent tubes at the same time. Precision needle valves provide stable flow rates for independently controlled flow channels for sorbent tube sampling over a range of 5–500mL/min. Quick connectors make sampling set-up fast and easy. The systems are compact, portable, and feature several safety measures including; lockable covers, back-up batteries and a waterproof case (Model 2012 only). Each system comes with a rechargeable battery that provides 12 hours of continuous sampling on each channel with remarkable stability.

The Model 2012 software provides individual programmable start date, start time, and sampling duration for all four channels. The software enables the user to perform individual sampling, sequential sampling, and parallel sampling for up to 12 hours (with booster battery). Continuous sampling of all 4 sampling channels simultaneously (at different flow rates) is also possible.

Peripherals

- Dust filters
- Vespel ferrules, O–rings
- Transfer Lines
- Simulant Mixes
- Heater Sleeves

CDS maintains a global network of trained representatives ready to assist you. For a complete listing of authorized dealers, visit **www.cdsanalytical.com** and select "International Sales."

Our instruments feature universal compatibility with all GC and GC/MS systems.

At CDS, we take responsibility for our instruments throughout their entire lifetime by supporting them with upgrades, parts, and services. We are always on call to answer questions and resolve issues.

All CDS Analytical instruments are backed by a one-year warranty; we also offer the option of extended warranties. Customers have the opportunity to lock in comprehensive maintenance and service contracts for any CDS instrument.

CDS Analytical

Worldwide Headquarters
465 Limestone Road
P.O. Box 277
Oxford, PA 19363-0277 USA
Toll Free 800-541-6593
610-932-3636
Fax 610-932-4158
www.cdsanalytical.com

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