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PRODUCT NOTE

THERMAL ANALYSIS

Pyris 1 TGA
Thermogravimetric Analyzer



Get unsurpassed accuracy with the Pyris 1 TGA

PerkinElmer is the leader in high sensitivity thermal analysis instrumentation, providing you with the confidence to achieve fast, accurate, reproducible results. The Pyris™ 1 TGA incorporates PerkinElmer's 40 years of continuous innovation and experience into its intelligent design.

The Pyris 1 TGA's design, optimal temperature control and high sensitivity ultra-microbalance provide the unsurpassed accuracy that is required in your laboratory.

Our TGA embodies the next step in thermogravimetric evolution: simplicity and ruggedness in an easy-to-use, easy-to-maintain, automated system. Never before has there been a TGA more perfectly suited for demanding environments and research and development.

The system is designed to fully utilize the enhanced features of Pyris software, the benchmark application for thermal analysis data handling and analysis.

The optional Autosampler accessory for the Pyris 1 TGA brings efficiency and convenience to your laboratory for higher throughput.

Integrate our system into your network to make the most of your laboratory's resources. The Pyris 1 TGA is a powerful combination of hardware and software that delivers answers – not just data!

Key Features

- **High sensitivity** ultra-microbalance
- Balance **thermally isolated** from furnace
- **Fast cool-down** increases throughput
- **Most responsive temperature control** gives accurate results
- **Efficient gas switching** gives reproducible results
- **Ion stream** eliminates static drift
- **Autosampler** runs 20 samples unattended
- **AccuPik** improves automated measurement of volatile samples

PerkinElmer®
precisely.

Innovative features enable remarkable results

We started with the highest standard of instrument quality, optimal temperature control and high sensitivity ultra-microbalance. We gave the TGA an isothermal balance enclosure and improved the microfurnace environment. Then we added a quartz hang-down wire, an X-Y micro-alignment system for easy sample pan centering, and a direct reaction gas injection port to directly couple the sample specimen to the purge gas. With an autosampler and a host of innovative features, the results are remarkable.

Reduced furnace volume for even faster gas switching time

We reduced the volume of the furnace to improve gas switching time and provide improved accuracy in your results. A "chamber sleeve" regulates furnace convection by significantly reducing furnace chamber volume. Gas switching time is substantially reduced as a result of the smaller furnace area volume. Removal of oxygen during pyrolysis can be a problem for larger furnaces. Figure 1 illustrates the results obtained by the Pyris 1 TGA. During the oxygen-free pyrolysis segment of this experiment, the weight loss of oil and polymer are exhibited. The second portion of the same experiment displays the carbon and ash content determinations after efficiently switching the purge gas from an inert atmosphere to a reactive, oxidative atmosphere.

Unique furnace design for the ultimate in temperature control

Temperature control of our low-mass furnace design is optimized by our unique heater/sensor furnace technology. The platinum heater element is also the temperature sensor. By accurately coordinating the furnace heating and sensing under tight feedback control, you can count on precise results. This exceptional furnace control is invaluable for routine experiments and for demanding applications such as moisture evolution and compositional analysis (Fig. 2).

Your choice of calibration techniques

You can use Curie point reference materials to simply and accurately calibrate sample temperature or melting point reference materials for calibration.

Reduce furnace cool-down time and make cleanup a snap

Furnace cool-down times are reduced and sample throughput is increased with the "tube-within-a-tube" technology. The Pyris 1 TGA will cool down from 1000 °C to 40 °C in less than 15 minutes. No optional cooling accessories are required. After your TGA experiments are complete, furnace tube cleanup is a snap with the unique quick-release, split furnace tube.

Eliminate static with our ion stream

Send an invisible curtain of charged particles to surround the sample loading area. The static attraction between the sample pan and your sample or the sample pan and the furnace wall is effectively eliminated. Loading fine-powdered or static-sensitive samples is greatly improved.

And there's even more...

- X-Y micro-alignment system for easy sample pan centering.
- Reaction gas injection port to couple the sample specimen to the purge gas.
- Water-cooled jacket accessory for starting experiments below room temperature.

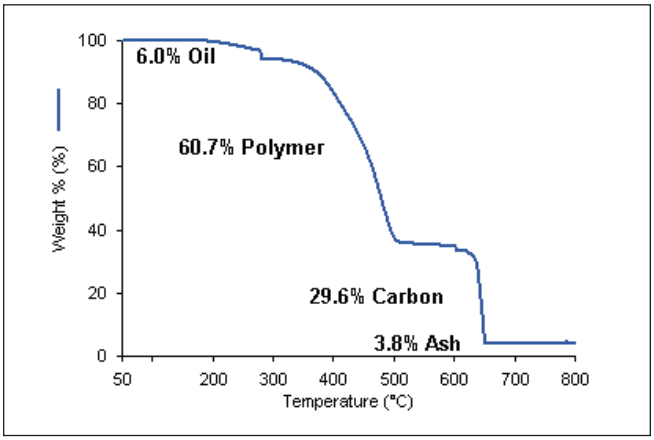


Figure 1. Typical compositional analysis of an elastomer determines its oil/plasticizer content, polymer content, carbon content and inert filler content. Gas switching from nitrogen to oxygen is programmed at 570 °C.

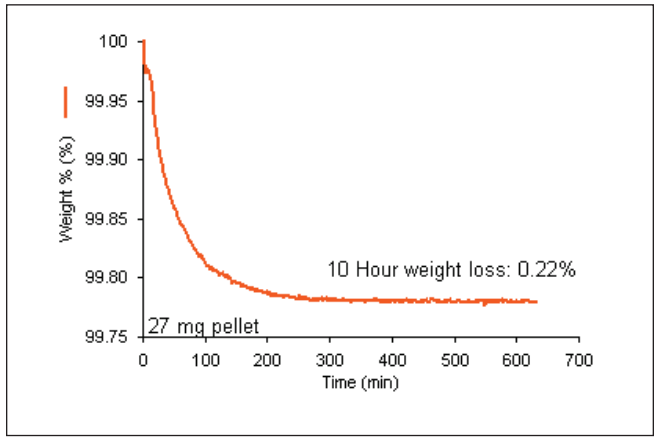


Figure 2. Overnight moisture analysis of a PET pellet shows outstanding long-term instrument stability and high-sensitivity measurement.

Pyris 1 TGA autosampler, a world-class performer

The Pyris 1 TGA autosampler brings R&D accuracy, sensitivity and reproducibility to the real world of material inspection. Whether you need in-process product quality inspections or statistical research, the Pyris 1 TGA autosampler delivers fast, accurate results, time after time.

The Pyris 1 TGA autosampler is composed of two subsystems – the autosampler carousel with 20 sample positions, and the optional AccuPik™ accessory.

The Pyris 1 TGA autosampler carousel has an environmental cover that enables the samples to be maintained in a controlled atmosphere while queued to run. New samples can be added to the carousel to replace completed samples by simply pausing the play list, exchanging the samples and inputting the new information. Play lists are part of Pyris Player, the backbone of our automation software. With Pyris Player, the samples can be run using any number of different or similar methods, providing flexibility for autosampler operation. Pyris Player automatically tares pans and weighs samples prior to analysis.

The **AccuPik** accessory was designed to protect the validity of your aqueous or volatile samples. Samples are sealed in a sample pan and then queued to run. With the autosampler, the AccuPik accessory automatically pierces the sealed sample pan just before it is loaded into the TGA, providing an additional level of protection against volatilization of samples. Now you can program volatile sample analysis for unattended or overnight runs!

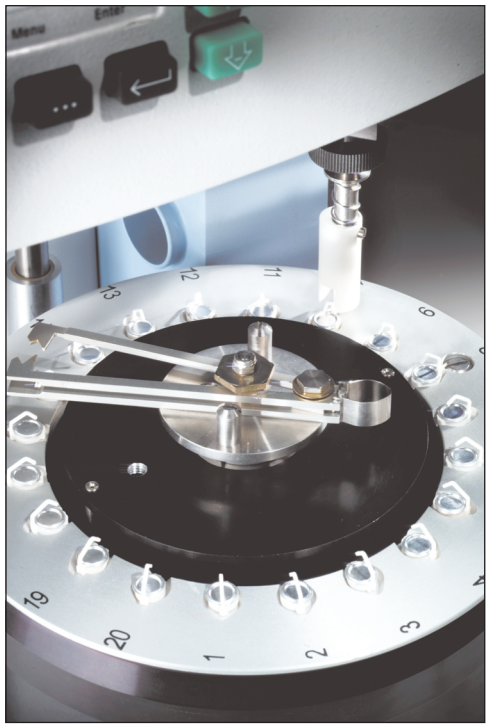


Figure 3. The Pyris 1 TGA autosampler has 20 positions and is operated by Pyris Player, the backbone of our automation software. Also shown is the optional AccuPik accessory.

Hyphenated techniques

The Pyris 1 TGA is compatible with most FT-IR systems (including the PerkinElmer Spectrum One), Mass Spectrometer and GC/MS systems. TGA delivers quantitative results whereas the coupling with IR or MS can identify the evolved gases.

Key applications for hyphenated techniques:

- Molecular structure analysis
- Identification of decomposition products for safety applications

Pyris software

The Pyris 1 TGA has been optimized to run under the industry's choice for data analysis and handling – Pyris software, the engine behind PerkinElmer's thermal analysis techniques.

Use Pyris software on a standalone instrument or network your entire thermal lab. Data files can be easily imported and shared for maximum flexibility. Use Pyris Player to simplify setup and automate sample analysis sequences, including curve optimization and calculations. You can even set up pass/fail criteria for your analysis and automatically qualify your material using the Tolerance Test. In addition, you can switch from inert gas to reactive gas automatically by using the Pyris software controlled gas station.

Regulatory compliance

Pyris Enhanced Security, an add-on to our Pyris software, helps users in both research and quality control to comply with the stringent data security requirements of the regulated industry, including the 21 CFR Part 11 mandates of the U.S. Food and Drug Administration.

SPECIFICATIONS

Instrument

TGA design	A vertical design with a high sensitivity balance and quick response furnace. The balance is located above the furnace and is thermally isolated from it. A precision hang-down wire is suspended from the balance down into the furnace. At the end of the hang-down wire is the sample pan. The sample pan's position is reproducible.	
Sample Atmosphere	Static or dynamic, including nitrogen, argon, helium, carbon dioxide, air, oxygen, or other inert or reactive gases. Analyses done at normal or reduced pressures.	
Standard furnace	Temperature Range: Scanning Rates: Temperature Precision:	Subambient to 1000 °C 0.1 °C/minute to 200 °C/minute ±2 °C
High temperature furnace	Temperature Range: Scanning Rates: Temperature Precision:	50 °C to 1500 °C 0.1 °C/minute to 50 °C/minute ±5 °C
Balance	Tare: Sensitivity: Accuracy: Precision: Capacity:	Reproducible to ±2 µg 0.1 µg Better than 0.02% 0.001% 1300 mg
Hang-down wires	High temperature quartz, nichrome, or platinum	
Sample pans	Standard Furnace: High Temperature Furnace:	Platinum or Ceramic with capacity of 60 µL Platinum or Ceramic with capacity of 250 µL
Sample mass range	Up to 1300 mg	
Cooling	Forced air cooled with an external fan and internal booster purge Standard Furnace: High Temp Furnace:	 1000 °C to 40 °C in less than 15 minutes under normal operation 1500 °C to 100 °C in less than 30 minutes under normal operation
User control	Operates on Pyris software, fully tested on Windows® operating system.	
Hyphenated techniques	Compatible with the Spectrum One as well as most other FT-IRs and mass spectrometers (MS).	
Gas switching	Fast, thorough and efficient due to reduced furnace volume. Less than 3 minutes to purge the sample area of ambient gases (remove 99% of oxygen) and replace the volume with an inert purge gas. 10 minutes to achieve a 99.99% oxygen-free environment.	
Quality assurance	Developed under ISO 9000	
Dimensions (HxWxD)	67 x 28 x 60 cm	
Weight	40 kg	
Power requirements	100 to 240 Volt, 50/60 Hz	

Accessories

Autosampler	Computer controlled, can run up to 20 samples unattended and can be customized through Pyris Player to meet your analysis needs and increase productivity. Operating Temperature:	 -20 °C to 1000 °C
AccuPik accessory	Ensures accurate volatile analysis by piercing a hole seconds before the run to avoid evaporation and change in volatiles content.	
TAGS	The Thermal Analysis Gas Station (TAGS) allows control of the gas flow and switching through Pyris software.	

Special software features

Pyris Player	Built into Pyris software, this feature allows autosampler control with automatic data analysis.
AutoStepwise TGA	Optional advanced software package that automatically determines start and end points of a weight loss and switches between various heating rate and isothermal steps to optimize analysis.
TGA Decomposition Kinetics	Optional advanced software package that provides the capability of determining the kinetics of decomposition based on TGA data taken at several (3 to 6) heating rates.
Pyris Enhanced Security	Optional advanced software package for technical compliance to 21 CFR Part 11.

PerkinElmer Life and Analytical Sciences
710 Bridgeport Avenue
Shelton, CT 06484-4794 USA
Phone: (800) 762-4000 or
(+1) 203-925-4602
www.perkinelmer.com

PerkinElmer®
precisely.

For a complete listing of our global offices, visit www.perkinelmer.com/lasoffices

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