ACTS

eiprotech 智爱科技

Aerosol Collection Thermal Desorption System

Turn Your Existing GC–MS
into an Online Organic Aerosol Analyzer

A modular front end for automated molecular analysis of organic aerosols.

Soft Connection

10 cm Needle +
Double Septa

No GC Modification

Easy Installation
& Switching

Automated Analysis

1–2 h Time Resolution
Continuous
Measurements

Broad Organic Coverage

Hydrocarbons +
Oxygenated Organics

EXISTING GC–MS → **ACTS FRONT END** → **MOLECULAR-LEVEL GC–MS OUTPUT**

How ACTS Works

Automated aerosol collection, thermal desorption and direct GC–MS introduction

MODE 1

Sampling + Analysis

Collection and Thermal Desorption Cell (CTD) · parallel sampling and GC–MS analysis

AEROSOL INLET → CYCLONE + HUMIDIFIER → CTD — COLLECTION

NEEDLE BETWEEN SEPTA

↓

GC–MS — PREVIOUS SAMPLE

- Aerosols are collected in the CTD
- Needle rests between the double septa
- Sampling and analysis proceed together

SAMPLING AND ANALYSIS RUN IN PARALLEL

MODE 2

Thermal Desorption

Collected organics are introduced directly into the GC–MS

He / MFC → CTD — THERMAL DESORPTION → 10 cm NEEDLE

DOUBLE SEPTA + GC INLET

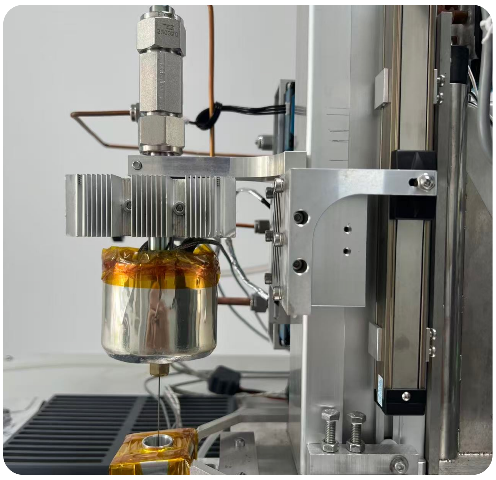
↓

GC–MS

- Needle enters the GC inlet
- Collected organics are thermally desorbed
- Helium transfers analytes directly

10 cm DIRECT TRANSFER

Soft connection: 10 cm needle + double septa



01 Needle rests between the two septa during sampling.

02 Needle enters the GC inlet during thermal desorption.

03 No drilling, rigid metal unions or structural GC modification.

RAPID CONNECTION, REMOVAL AND SWITCHING

Designed for Existing GC–MS Platforms

	ACTS	Representative TAG-type configurations
CTD–GC connection	10 cm needle + double septa	High-temperature valve / rigid plumbing commonly used
GC modification	Not required	Dedicated integration may require modification
GC flexibility	Rapid connection / removal	More integrated dedicated configuration

TAG architectures have evolved; comparison refers to representative published configurations and illustrates system integration only.

Performance & Chemical Coverage

From n-Alkanes to Oxygenated Organics

ACTS Quantifies Oxygenated Organics Beyond Alkanes

~0.07 µm
Aerosol Collection D_{50}

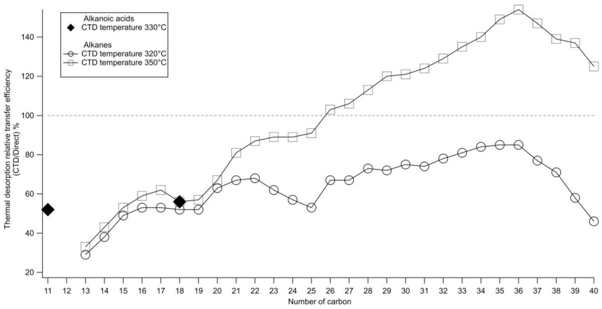
>90%
Collection Efficiency ≥0.16 µm

33–154%
C_{13}–C_{40} n-Alkane Relative Transfer Efficiency

~7%
7-Day Signal Drift

0.5–0.8 ng
C_{36} Hexatriacontane Empirical Detection Limit

High Transfer Efficiency for Mid- to Low-Volatility Organics

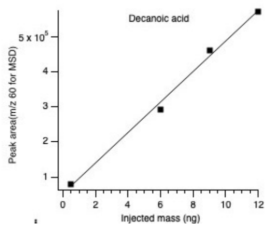


Open squares CTD 350 °C · open circles CTD 320 °C · filled diamonds alkanoic acids, CTD 330 °C.
y-axis: relative transfer efficiency, CTD ÷ GC direct injection (%). x-axis: carbon number.

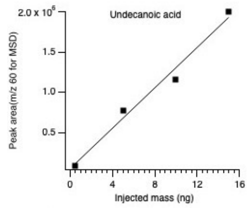
C_{36} Hexatriacontane = 154% at 350 °C

Measured CTD/direct-injection response; values >100% reflect the empirical relative-transfer method.

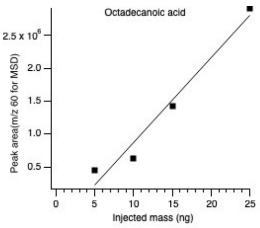
Beyond Alkanes: Oxygenated Organics



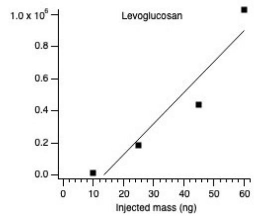
Decanoic acid · R^2≈0.99



Undecanoic acid · R^2≈0.98



Octadecanoic acid · R^2≈0.97



Levoglucosan · R^2≈0.91

Empirical Detection Limits

Compound	ACTS
Decanoic acid	≤0.5 ng
Undecanoic acid	≤0.5 ng
Octadecanoic acid	1–5 ng
Levoglucosan	5–10 ng

Sensitivity Benchmark

Compound	ACTS	Representative Published TAG
C_{16} Hexadecane	≤0.05 ng	0.074 ng[1]
C_{36} Hexatriacontane	0.5–0.8 ng	7.2 ng[2] · 0.5 ng[3]
Decanoic acid	≤0.5 ng	0.9 ng[1]
Levoglucosan	5–10 ng	6.3 ng[1]

ACTS measures both hydrocarbons and GC–MS-compatible oxygenated organics.

Comparable sensitivity to established TAG systems, with strong performance for selected high-carbon-number compounds.

Highly oxygenated species may require derivatization or other analytical approaches. TAG values represent selected published configurations and are not intended to represent all TAG systems. [1] Williams et al., 2006; [2] Kreisberg et al., 2009 (TAG–GC/MS); [3] Worton et al., 2012 (TAG–GC×GC/MS).

Applications in Real Aerosols

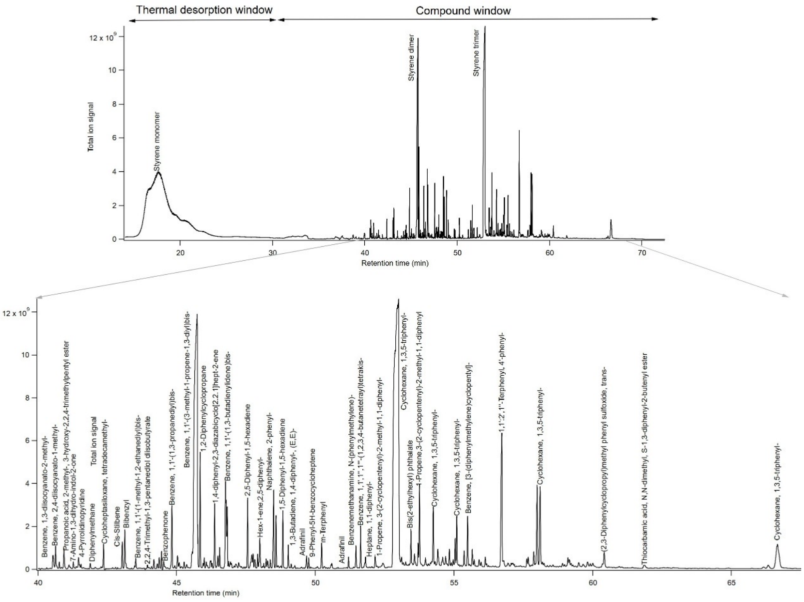
Molecular speciation across ambient, indoor and field aerosol samples

Styrene & Styrene Oligomers in Ambient Air

Shanghai Dianshan Lake Science Observation Station · 18 May 2023, 11:00

Styrene Monomer · Dimer · Trimer

AUTHENTIC RESOLVED CHROMATOGRAM

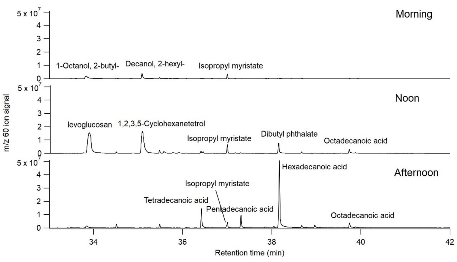


Numerous resolved molecular peaks demonstrate broad compound-level separation in a real ambient air sample.

Indoor Oxygenated Organic Aerosols

m/z 60 Extracted Ion Chromatograms ·
Morning · Noon · Afternoon

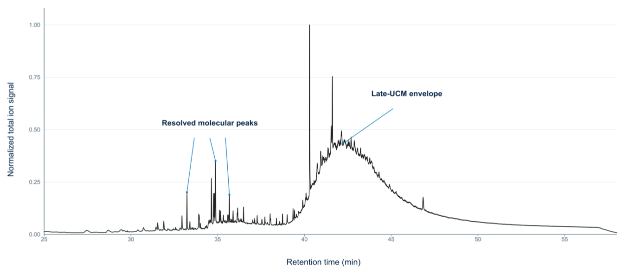
Shanghai Bay Valley Tech Park · September 2024



m/z 60 extraction highlights time-resolved changes in levoglucosan, alkanoic acids and other oxygenated organics.

Heavy Petroleum / UCM in Ambient Air

AMBIENT AIR · SAMPLE NO. 189 · 20 JUN 2026 · 22:00



Field evidence for heavy, low-volatility petroleum-related organics, with resolved peaks above the UCM envelope.

Molecular Speciation Across Sources and Functionalities

Source-specific tracers · Oxygenated organics · Heavy petroleum / UCM signatures

Peer-Reviewed Instrument Study

Yaping Zhang, Feng Shen, Yao Zhang, Lin Wang, Juntao Huo, Wenyu Chu, Xin Yang & Xiaofei Wang.
A low-cost in-situ instrument for organic aerosol speciation using thermal desorption. Aerosol Science and Technology (2026).
DOI 10.1080/02786826.2026.2614032

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