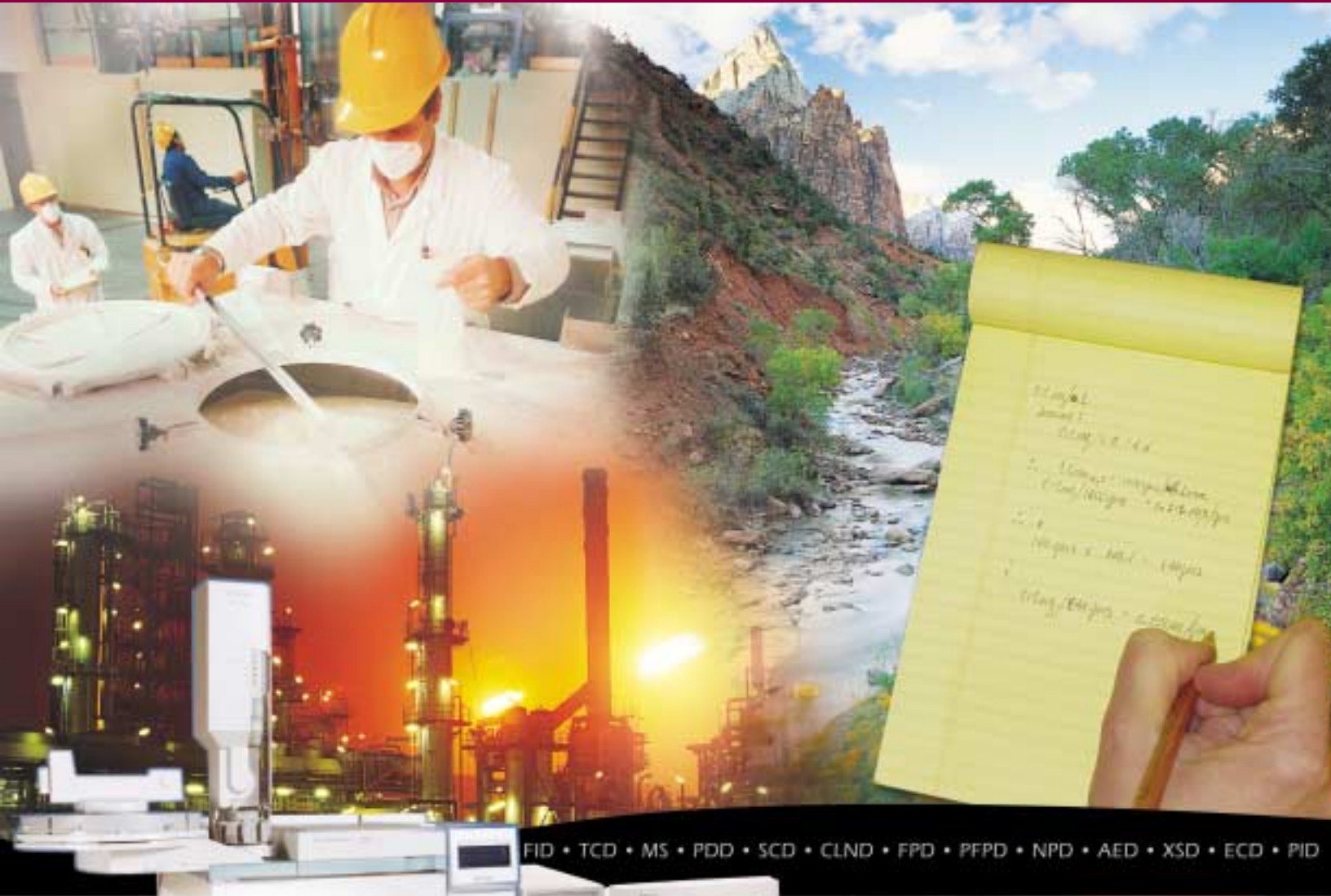


ANTEK APPLICATED

Turn-Key GC *solutions*



FID • TCD • MS • PDD • SCD • CLND • FPD • PFPD • NPD • AED • XSD • ECD • PID



The ANTEK *advantage*



Antek patents chemiluminescent nitrogen detection apparatus & method

Antek introduces first total nitrogen chemiluminescence analyzer

Antek designs and manufactures its first gas chromatograph

Antek opens operation as a laboratory instrumentation manufacturer's representative

1965

1975

Applicating a GC for a specific function is often a complicated, tedious process. Not only does it require a **great deal of GC expertise**, but it also demands **time and human manpower**—valuable resources that have become increasingly limited due to downsizing and tighter work demands. Yet, as **regulations and methodologies continue to evolve**, your laboratory can maintain the pace. ■ ANTEK applies our technical expertise to your unique application challenge. We combine the most appropriate technologies to create a **turn-key system** that is not only specific to your needs, but is also guaranteed to **generate a return on your investment**. Our customers benefit from increased productivity at a reduced cost, while **maintaining the competitive edge** as regulatory mandates, analysis methods, and technologies evolve.

Antek initiates our Applied GC Program

Antek applies chemiluminescence technology to GC detection, introducing first nitrogen-specific GC detector (CLND)



Antek introduces first microwave-heated GC column oven to analytical instrumentation market

Antek introduces bench-top & first on-line GC units for methanol-specific measurements in crude oil



Antek introduces first total sulfur chemiluminescence analyzer

Antek receives second patent for chemiluminescent sulfur detection apparatus/method

Antek introduces first sulfur chemiluminescent GC detector (SCD)



Antek receives first patent for chemiluminescent sulfur detection apparatus/method

Antek becomes an HP (now Agilent) Channel Partner

1985

1995

2005

EXPERTISE

- ANTEK is recognized as a long-standing chromatography leader. Our extensive background knowledge of real world sample challenges spans a broad range of applications, including:
 - **Petroleum**
 - **Chemical**
 - **Food & flavor**
 - **Environmental**
 - **Pharmaceutical**
- We maintain active involvement in standardization committees and regulatory agency meetings, staying abreast of industry's continually changing needs.

TECHNOLOGY

- ANTEK is the *only* multi-oven, multi-detector technology provider. Plus, our patented microwave heated GC column oven and chemiluminescent detectors provide maximum output at significant cost savings.
- As a value-added reseller of various chromatographic technologies, we offer an extensive selection of GCs, detectors, sampling devices, and software applications.
- Our fully customizable, turn-key systems allow virtually endless testing options.
- We offer systems for all standard chromatographic methods (ASTM, IP, DIN, GPA, CGSB, EPA, CARB, USP, etc.).

SUPPORT

- ANTEK systems are backed by a highly knowledgeable worldwide support team.
- We guarantee a return on your investment:
 - **Save manpower & time**
 - **Rest assured that your system will meet your specific testing needs**
 - **Meet timely deadlines for regulatory compliance**
 - **Upgrade existing equipment with cutting-edge technology**



Ultimate Application *versatility*

From single column to multi-valve, multi-detector... even multi-oven technologies — your chromatographic analysis options are limitless!

Contact us about your unique custom applications or to discuss upgrading an existing GC system.

Petroleum Refining

Liquid Hydrocarbons:

- Simulated Distillation (SimDist), gasoline through whole crude range: ASTM D 3710, 2887/extended, 5307, 6417, 6352, high temperature SimDist; optional sulfur & nitrogen analysis
- DHA Detailed Hydrocarbon Analysis: ASTM D 5134
- DHAX (DHA including oxygenates): ASTM D 6729, 6730, 6733
- Oxygenates in Finished Gasoline: ASTM D 4815
- Ethanol Content in Denatured Fuel Ethanol: ASTM D 5501
- Aromatics in Finished Gasoline: ASTM D 3606, 5580
- BTX Analysis (benzene/toluene/xylene): ASTM D 6563
- Sulfur Impurities in Benzene (thiophene): ASTM D 4735
- Sulfur in Light Petroleum Liquids: ASTM D 5623
- Detailed Front End of Whole Crude Samples
- Methanol in Crude (Antek benchtop or process GC available)
- GC/AED Multi-Dimensional Customized Analysis

Refinery Gas & LPGs:

- RGA Refinery Gas Analysis: ASTM D 1945, UOP 539
- Extended Fast RGA & Custom Refinery Gas/Liquids Analysis
- LPG: ASTM D 2163, 2504, 2505, 2712
- Dissolved Gases (TOGA Transformer Oil Gas): ASTM D 3612
- Sulfur Traces in Ethylene & Propylene: ASTM D 2420, 5303, 5623
- Natural Gas & NGLs: ASTM D 5504; ISO 6974; GPA 2177, 2186, 2261, 2286

Environmental

- Trace Level Impurities in Wastewater: EPA methods
- Trace Benzene in Water
- Trace Oxygenates in Water

Miscellaneous & Custom Specialty

- Speciated and Total Sulfur and/or Nitrogen
- Sulfur Impurities in Food Grade CO₂
- Speciated and Total Nitrogen in Ethylene & Benzene
- Impurities in Propylene
- Paraffins, Aromatics & Napthenes in Hydrocarbons
- Trace Oxygenates in Hydrocarbons
- USP/Pharmaceutical Applications

Detector	MDL
FID Flame Ionization	<5 pg/sec
TCD Thermal Conductivity	<400 pg propane/mL
MS Mass Spectrometer	Varies with operating/ionization mode
PDD Pulsed Discharge	Low ppb
SCD Sulfur Chemiluminescence	<1 pg/sec S
CLND Nitrogen Chemiluminescence	<3 pg/sec N
FPD/PFPD Flame Photometric	>10 ³ S >10 ⁴ P
NPD Nitrogen Phosphorous Specific	<0.4 pg/sec N <0.2 pg/sec P
AED Atomic Emission	2 pg/sec S
XSD Halogen Specific	Varies with operating conditions
ECD Electron Capture	<0.008 pg/sec
PID Photoionization	Varies with operating conditions

ANTEK Sulfur & Nitrogen Detectors

SCD / CLND — Proven Chemiluminescence Technology

Antek's 7090 Series provides a single flow path with dual channel chemiluminescence detection, saving laboratories time, bench space, and money. These unique detectors also provide a linear, equimolar response and have sensitivity that is stable over time, providing highly reliable results.

- Nitrogen, sulfur, or simultaneous nitrogen/sulfur— buy one detector, add a second later
- Add to FID for 1 injection, 3 results
- Complete sample combustion enhances short- and long-term stability, equimolarity and selectivity
- Ideal for agriculture, biotechnology, biochemical, food & flavor, solid phase synthesis, organic synthesis, petrochemical, petroleum, pharmaceutical, & polymer/plastics

Dynamic Range	Linear Calibration	Quench-Free Operation	Ease of Use	Approximate Cost	Typical Applications
10 ⁷	✓	✓	★★★★★	\$	Most organics
10 ⁵	✓	✓	★★★★★	\$	Fixed and inorganic gases; most organics
10 ⁶	✓	✓	★★★	\$\$\$\$	Detection based on molecular structure
10 ⁵	✓	✓	★★★★★	\$	Helium photoionization mode: universal Electron capture mode: freons, chlorinated pesticides, halogen compounds
>10 ⁴	✓	✓	★★★	\$\$\$	Sulfur species
>10 ⁴	✓	✓	★★★	\$\$\$	Nitrogen species
<20 pg/sec S 0.9 pg/sec P (FPD)	✓ quadratic		★★★	\$\$	P, As, Si, S, N
10 ⁵	✓		★★★★★	\$	Nitrogen and phosphorous species
10 ⁴	✓	✓	★★★	\$\$\$\$	P, As, Si, S, N; PFPD tunable to 26 elements
>10 ⁵	✓ (at >10 ⁴)		★★★	\$\$	Halogen
>5x10 ⁴	✓	✓	★★★	\$\$	Freons, chlorinated pesticides, and other halogen compounds
10 ⁶	✓	✓	★★★	\$\$	Environmental applications, organics

ANTEK Microwave GC Column Oven

Save time & money while increasing your lab's performance...

- By using microwaves to heat only the column, not the surrounding air and oven walls, ANTEK's Microwave GC Oven minimizes heating and especially minimizes cooling & cycle times — *shortening every analysis.*
- Not only does the Microwave GC Oven enable *Fast GC* applications, but it also allows you to run conventional GC applications faster. Easily program incremental temperature ranges from 1°C/minute to 360°C/minute — *enabling ultimate application flexibility and speed.*
- With ANTEK's Microwave GC Oven, two columns can be programmed independently inside your existing column oven — *doubling your laboratory's GC capability.*

UNLIMITED OPTIONS!

Custom Options & Accessories

- **Sampling Options**
 - Valve injectors: *gas or pressurized liquid*
 - Autosamplers: *wide variety for vial injections, headspace, SPME, etc.*
 - At-line, automated 24/7 sampling systems
- **Data Handling & Instrument Control**
 - GC control & data acquisition software*
 - Customizable SimDist software
 - User-defined custom reports & calculation software

*Please contact your ANTEK representative for details.

Solutions Study 1

CHALLENGE:

More responsibility, fewer people

SULFUR IN NATURAL GAS: FID/SCD

“

Since we have more responsibilities and fewer people, it makes sense to outsource development and configuration. We **get a better job than we would do ourselves**, and it frees us up to focus on our “big picture” projects.

A challenging aspect of our custom application involves not only separation of light sulfur compounds, such as H₂S and COS, but also detection at **sub-ppm levels**. Our down-stream customers can tolerate very little COS. This system enables us to strictly monitor these sulfur levels, ensuring a **quality product at delivery point.**”

BOB ARMBRUSTER
WILLIAMS ENERGY



Solutions Study 2

CHALLENGE:
Reduced budget, multiple needs

EXTENDED FAST REFINERY GAS

“ We chose to outsource the development of our GC application for a simple reason: it is **more cost effective and efficient** to do so than to develop applications in-house.

In the past, we usually required two or more instruments to generate the data we needed. Now, with our custom applied GC from Antek, **one instrument can handle refinery gas, LPGs and liquids**, analyzing out to C₁₄ if necessary. Antek has benefitted our process by developing an **extremely flexible, multi-purpose GC** capable of analyzing all our refinery liquids, off gases and LPG samples. The **savings** created with the purchase of one multi-purpose GC **allowed us to purchase other needed laboratory equipment & supplies** that would have been purchased over several years.”



PAT TIERNEY
HUNT REFINING

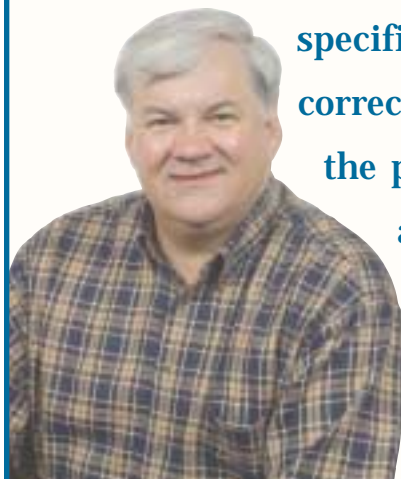
Solutions Study 3

CHALLENGE:
Complex SimDist application

HYDROCARBON SIMDIST

“ Realizing we didn't have the in-house resources to develop the complex application we needed, we outsourced our GC application to Antek. Our custom Antek-Applied SimDist GC and data station allows us to **quickly screen samples with a method that requires only seven minutes per sample**. This is a distinct advantage over our automatic physical testing units, which require 30 minutes per sample and considerable time from our staff.

Our laboratory receives 200 samples each week, representing numerous brands from retail gasoline stations throughout Alabama. It is our responsibility to quickly screen these samples, **identify any that fail to meet state specifications, and take corrective action before the product can cause any damage**. We have



▼ *Continued next page...*

ANTEK SimDist Solutions

The quick, fully automated solution for routine screening, refinery stream characterization, & process control... all from one multi-method GC!

- successfully identified several distillation violations using our Antek-Applied system. In more than one case, the violation was caused by inadvertent introduction of diesel fuel into a gasoline storage tank. Uncorrected, this problem would have led to dilution of the crackcase oil and engine failure. However, we were able to **quickly respond with corrective action.**

The Antek-Applied SimDist GC system has been an asset to our laboratory. It shows good **correlation** with our automatic physical distillation units, yet it offers two distinct advantages: **speed and simplicity.**"

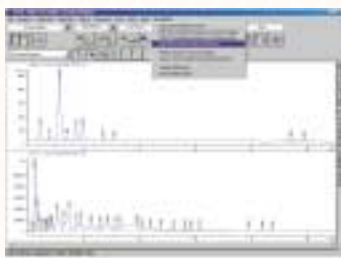
VAUGHAN JOHNSON
STATE OF ALABAMA
DEPARTMENT OF AGRICULTURE



APPLICATIONS

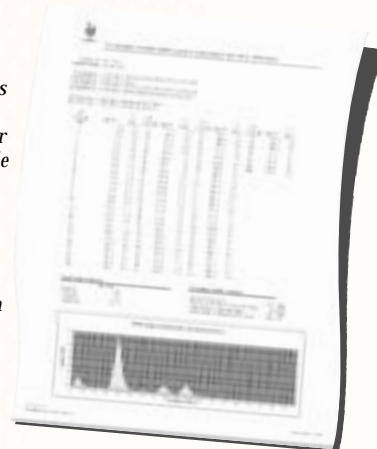
- Evaluate boiling range of various hydrocarbon fractions
 - Gasoline
 - Jet fuel & diesel
 - Crude oil
 - Petroleum wax
 - Gas & lube oils: engine oil volatility
 - HighTemp SimDist: residual/crude oil
- Simulate crude distillation tower performance
- Measure and predict yields from new crudes/products
- Optimize refinery operations
- Test quality of intermediate and final product
- Rapidly screen fuels for regulated final boiling point compliance
- Use in conjunction with SCD/CLND to determine sulfur and nitrogen contribution in various boiling fractions

UNIVERSAL SIMDIST SOFTWARE



ANTEK SimDist Systems:
Whether you're building a new GC system or you're upgrading existing GC equipment, Antek offers fully applied solutions for your SimDist method specifications. Our customizable software is compatible with virtually all Windows-based GC data acquisition systems.

Custom SimDist calculations including D86, D1160, Noack, cutpoints and fractions are just a few of our standard options. Utilize the automatic export capability to deliver data and reports to your network destinations as specified by the user.



GC APPLICATIONS

Turn-Key, Applied GC Solutions

Antek provides state of the art solutions designed to your custom specifications and/or adhering to standard methods as defined by organizations such as ASTM, GPA, UOP, etc. Utilizing our stream selector valve options, Antek systems can provide 24-hour/7-day automated analysis for your facility, including remote access via PC.

Product & Application Support

- Hardware configuration, software installation, system verification
- Custom application development
- System upgrades of virtually any GC
- Spare parts and consumables
- Calibration and check standards
- Service and preventive maintenance
- Telephone and modem-link technical support
- Training courses
- Continual developments based on customer input

Standard Features

- System development according to standard/customized methods
- Factory acceptance test, including calibration & certification data using customer-provided samples
- On-site installation and training
- Documentation for complete system
- Real-time remote diagnostics and support via modem
- One year warranty



ANTEK Custom Calculation Software

Add custom calculation capability to completely automate your Refinery and Custom Gas, Natural Gas, or LPG analyzer operations. The Antek Custom Report Generator is based on an easy to edit/customize Excel-based format that is compatible with virtually all Windows-based GC data acquisition systems.

CALCULATIONS INCLUDE:

- specific gravity
- vapor pressure
- BTU & calorific values
- molecular weight
- liquid volume percent
- weight percent
- user-defined values

Universal SimDist software also available; see inside for details.



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