

OAK RIDGE NATIONAL LABORATORY FUELS, ENGINES, AND EMISSIONS RESEARCH CENTER

A U.S. DEPARTMENT OF ENERGY NATIONAL USER FACILITY.

Analytical Chemistry Laboratory

Liquid Chromatography

- UV Detection and Quantification
- Ion Trap Detector with electrospray interface. Mass range 6000 Daltons.
- MS-MS capability for studying parent-fragment ion relationships
- Capability for analysis of carbonyl derivatives (aldehydes and ketones) and higher molecular weight polar organics

Volatile Gas Chromatography

- Volatile Organic Concentrator
- Mass Selective Detector
- Capability for concentration of 1 liter of sample, allowing detection limits in the ppb.

Semi-Volatile Gas Chromatography

- Mass Selective Detector
- Capability for analysis of PAH and other constituents of PM-SOF

Gas Chromatography

- Nitrogen-selective detector for the detection of nitroxyorganics

UV/Vis Instrument

- Characterization of liquid samples

Particulate Mass Determination

- Environmental Chamber for Temperature and Humidity Control
- Microbalance w/ 0.0001 mg resolution
- Microbalance w/ 0.001 mg resolution

Capillary Electrophoresis

- UV detection
- Capability for analysis of urea decomposition and related products

Bench-Flow Reactor

- Multiple gas mixing capability for small-scale monolith and powder catalysis studies.
- FTIR detection for many species
- Heated Chemiluminescence detection for NO_x
- SpaciMS detection for H₂ and in-situ kinetics studies

Support equipment and facilities for various chemical separations to support volatile, non-volatile, and semi-volatile organic sampling



The analytical laboratory supports ongoing activities in other laboratories through sampling and analysis of engine exhaust and other relevant matrices. Common samples include gas-phase hydrocarbons, particulate soluble organics, aldehydes, fuel characterizations, and semi-volatile organics. The lab features advanced instrumentation and staff expertise in sample collection, extraction, concentration, and analysis. Outside studies such as APBF-DEC and others have utilized the laboratory for sample analysis and method development. The bench flow reactor provides a capability for developing data to support modeling activities (CLEERS and others). One example of this data can be found in SAE # 2003-01-3246. Several other examples of data can be found on the CLEERS web site. (www.cleers.org) The reactor system supports research in several areas of aftertreatment technology, including both SCR and lean-NO_x traps. Examples of analyses performed in the laboratory can be found in most every publication from the FEERC.