

VOC Analysis: Agricultural Operations

Agricultural businesses involving animal feeding operations (AFO) produce volatile organic compounds. Most of them are noticeable as odorous compounds, adding to the smell of farms. The main appearance of the VOCs are in the form of organic solids. While the primary contributors to air emissions from farmland are widely studied, volatile organic emissions are not yet well understood. For example, in November 2019, the US EPA will finally provide a "Draft model for volatile organic compound emissions from swine, poultry and dairy farms", based on data gathered in the NAEMS (National Air Emission Monitoring Study). In said study, the EPA monitored 24 AFO sites in 9 states over two years to measure emissions of particulate matter, ammonia, hydrogen sulfide, and volatile organic compounds.

RJ Lee Group offers general accredited techniques based on gas chromatography with mass spectrometry (GC-MS) based on EPA methods TO-15 and TO-17. In addition, RJ Lee Group offers the unique capabilities of a proton transfer reaction mass spectrometer (PTR-MS), a high-end scientific tool that aims at VOCs; the instrument is mounted in a mobile lab and can be deployed at any site within a matter of minutes to hours.

Service Highlights

- » Air Monitoring using Gas Chromatography with Mass Spectrometry or Flame Ionization Detectors (GC-MS or GC-FID)
- » Certified for TO-15 & TO-17
- » PTR-MS Mobile Laboratory or Stationary Tool

PTR-MS

The Proton Transfer Reaction Mass Spectrometer (PTR-MS) is the perfect tool for the chemical characterization of emissions from agricultural operations. The low sensitivity of the instrument to volatile organic compounds (VOCs) allows the detection of the compounds of interest, even in very low concentrations at parts-per-trillion (ppt) level. Also, the PTR-MS can provide continuous real time measurements of the volatile compounds in one second increments, which makes it the perfect measurement technique.

Company Snapshot

Established: 1979

Employees: 225

EIN: 25-1375815

CAGE: OFG00

DUNS: 052545431

PSC: Q301 Laboratory Testing Services

Locations

Headquarters- Monroeville, PA

Columbia Basin Analytical Laboratories - Pasco, WA

Southpointe - Canonsburg, PA

Innovation Park - State College, PA

Sales Office - Oak Ridge, TN

Pertinent Codes

NAICS:

541380 - Testing Laboratories

Accreditations: TO-15 & TO-17

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www.rjleegroup.com

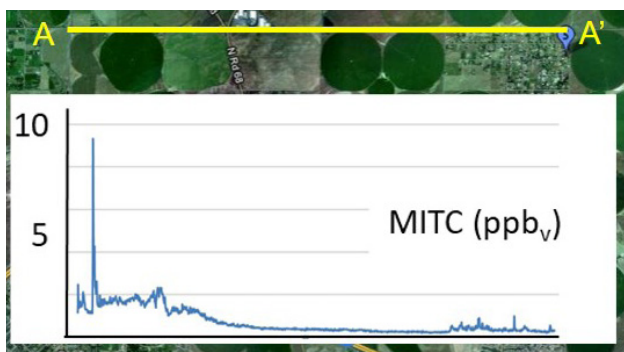
Case Study: Food Storage Control

A major fruit storage facility used the RJ Lee Group PTR-MS for a study on the impact of specific conditions on fruit spoilage. The key compound is 1-MCP (1-methylcyclopropene, formula C₄H₆) which delays the fruit maturation processes by binding to the ethylene receptors. Overall, there are multiple hundreds of VOCs within the flavor profile of, e.g., apples. Most of these compounds are either alkylic esters, acetic esters or mono- and sesqui-terpenes; PTR-MS is perfectly capable of distinguishing these compounds on the parts-per-trillion level, and within 1-second increment continuous monitoring. Therefore, PTR-MS is the perfect tool for identifying trends in VOC emissions from fruits and vegetables during storage.

Case Study: Pesticide By-Product Tracking

VOC emissions can not only be used to track specific AFOs, but also to the distribution of chemicals for the prevention of diseases on crops. RJ Lee Group was tasked to perform measurements on methyl isothiocyanate (MITC), a highly toxic compound that is the break down product of the application of metam sodium to moist soil. Metam sodium is a fumigant and pesticide against fungi and nematodes. Metam sodium is applied to the fields by aerial spraying through the irrigation system or by direct injection into the soils. Direct injection into the soils would be the preferred application method as it results in improved efficiency of use and significantly less release of MITC into the atmosphere.

RJ Lee Group identified and tracked the presence of MITC post application across several fields, with concentrations up to ½ of the EPA's acute human inhalation exposure limit of 22 ppbv.



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