

## Welcome to the November 2023 edition of LPD Lab Services Newsletter.

At LPD Lab Services we continually strive to offer a UKAS accredited service that provides cost effective solutions to many product and process problems. Whether our customers are large or small companies, or individual people - we aim to provide them with a high quality service - using our proven experienced staff. Offering a diverse range of analytical techniques to deliver the information needed in a format the customers can understand.

### This Edition at LPD Lab Services:

- **Reverse Engineering of Products and Processes.**
- **Spotlight on New Analytical Instruments and Capability Improvements**
- **ICP-MS -trace element analysis.**
- **GC-TCD-FID.**
- **FTIR Latest Fourier Transform Infra-Red Microscopy.**
- **Typical Customer Feedback.**

### Reverse Engineering of Products and Processes

Deformulation or reverse engineering allows for better diagnosis of product process steps. It involves the analysis and breakdown of a product to better understand the formulation, composition, and manufacturing methods. LPD Lab Services uses years of combined scientific expertise, knowledge, and techniques, and can reverse engineer a customer's own product or that of a competitor.

Reverse engineering creates opportunities for component product development and optimisation of process steps, allowing a company to remain competitive, improve performance and even grow their market share.

#### LPD Lab Services can offer:

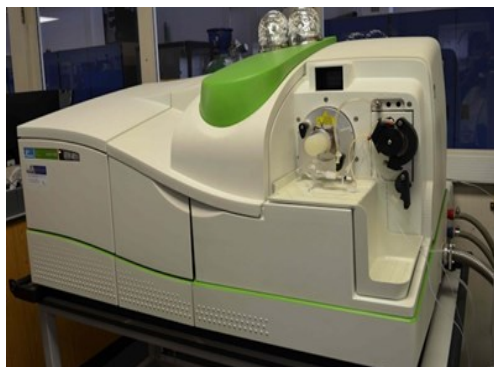
- Deformulation of a rival product or process to help find its base components.
- Reverse engineering of a process to determine possible subtle process steps.
- Determination of active ingredients in chemicals.
- Investigation of potential patent infringement.
- Test parts for substances banned under the RoHS directive.

In competitor analysis, reverse engineering can show how a competitor makes the product plus both the physical design and the structural information - down to microscopic levels. This information can then be used to drive, develop and improve a customer's own processes and products.

### Spotlight on New Analytical Instruments and Capability Improvements

#### ICP-MS—Trace Element Analysis.

LPD Lab Services have recently upgraded to a Perkin Elmer NexION 350D ICP-MS Instrument which has enabled analysis with much lower limit of detection than previously.



Inductively Coupled Plasma Mass Spectrometry (ICP-MS) is a technique routinely used to analyse trace levels of a wide range of inorganic elements. The ICP-MS allows for the detection and quantification of elements with atomic mass range from 7 to 250. This covers Lithium to Uranium. The typical detection limits are in the parts per billion (ppb) range and even parts per trillion (ppt) in some cases.

Analysis can be performed on a diverse range of sample matrices allowing accurate reliable results. More recently the lab have been analysing samples to differentiate between different isotopes of the same element, to determine enrichment within the samples.

#### GC-TCD-FID—Gas Analysis

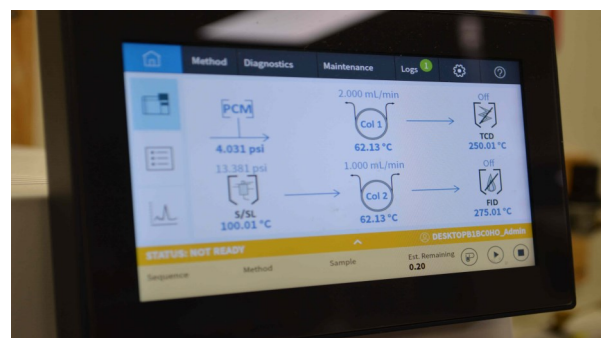
LPD Lab Services have recently commissioned and built a new GC-TCD-FID instrument for low molecular weight volatiles and gas analysis.

The laboratory's GC-TCD-FID instrument is an Agilent 8890GC which is a heating oven with advanced pneumatics and heated gas sampling valves. The instrument has both a TCD (Thermal Conductivity Detector) and a FID (Flame Ionisation Detector) to allow analysis, both qualitative and quantitative, of different analyte gases and liquids.

The TCD is a non-specific detector based on thermal conductivity. It works on the differences between the thermal conductivity of the analyte gas relative to the carrier gas. TCD cannot look for signature differences for specific gases so calibration gases are required for identification separated by characteristic retention times within the analytical column.

The FID involves detection by ionisation in a combustion flame. It provides a very high almost linear response giving a dynamic range from high concentrations down to low concentrations. The FID requires calibration gases for identifications based on retention times too.

Retention times are fixed for specific analytes for a given column type allowing reliable intermittent repeat samples and batches to be handled permitting routine analysis programs of work to be undertaken.





### One-Stop Shop for Industrial Process Problem Solving, Consulting and Routine Analysis

#### FTIR - Fourier Transform Infra-Red Microscopy

The laboratory's FTIR Microscope incorporates a number of unique tools including Micro-ATR imaging system that enables the collection of high resolution infrared images of extremely small samples or tiny localised contaminants to visualise the composition of materials based on FTIR spectral data.

ATR-FTIR mapping collects a spectrum for each pixel in the image. The image is created using the intensity at any IR wavelength or combination of wavelengths. This allows the distribution of organic chemical species to be seen allowing different compound location and types to be identified. The smallest spatial resolution of the imaging system is 1.5µm which means that one FTIR spectrum is collected every 1.5µm in the analysis area.

ATR mapping can be used on a wide range of samples, particularly when there is more than one component, as the mapping feature can provide a visual representation of the location of components in a sample at microscopic levels

#### Typical Customer Feedback

LPD Lab Services endeavours to offer the best service possible. In this edition the company thought it would share some of the most recent feedback we have had from some customers. Some information has been removed to protect client confidentiality, but these few examples illustrate the span of our company's typical client industry sectors and experience. Customers from pharmaceutical, water treatment, building material manufacturers, welding, and engineering industries have been included. These examples are from many different investigations including dust characterisation.

"....I asked her to pass our thanks on to you; but I also wanted to get in touch direct, just to reiterate how grateful we are to you - thank you so much at the risk of sounding like a stuck record!"

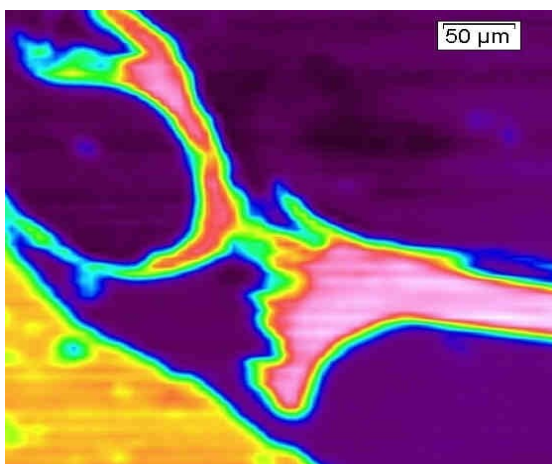
"....another excellent report. I'm actually glad that our FTIR-microscope has packed up and I didn't have to analyse these particles!"

"....thank you for your services, the report is very detailed. A great outcome..."

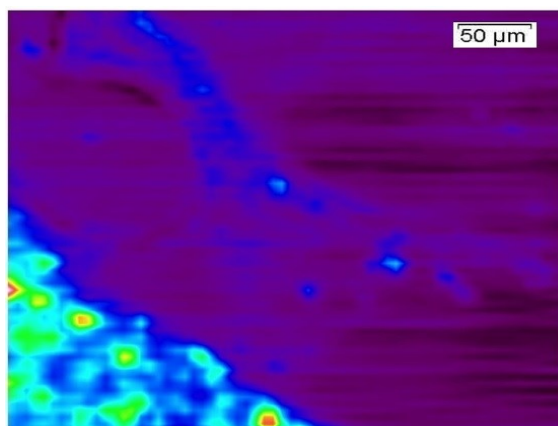
"...I just wanted to pass on a huge thank you from myself and x for your advice and assistance with our successful application for x. You were an absolute joy to work with and we found you extremely knowledgeable, patient, and professional. We would both most definitely recommend your services, and we will be sure to keep in touch. Thanks again."

".....interesting reading and great pictures. I really appreciate the swiftness of the turnaround of the work."

"....I really appreciate your help with this, the report was informative and gave the data we desperately needed. I very much appreciated the analysis of the results. Kudos for this report. We will definitely be enlisting your services again in the future."



This image shows an ATR image map for an expanded polypropylene with a talc filler. The image has been manipulated to show the polypropylene as the 'hotter' areas.



This image shows carbonate (representative of talc) as the 'hotter' areas, showing that the talc filler was not evenly distributed in this sample.



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Perkin Elmer Frontier FTIR with Spotlight microscope and accessories