





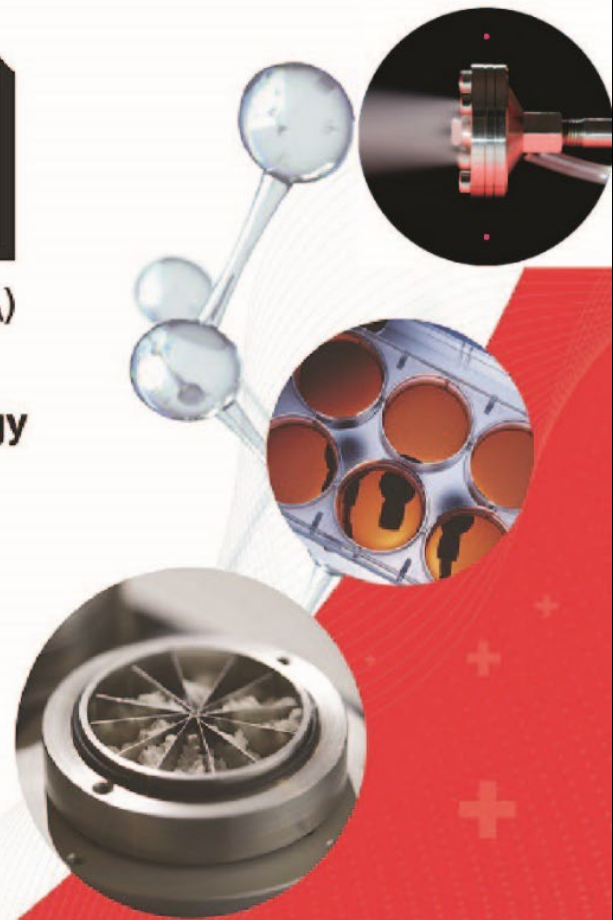
 **Inhalation Toxicology**

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Sampling Systems - Case Study M&G 1

Obtaining Simultaneous and Reliable Concentration and Particle Size Determination in Two Locations at Different Pressures

Obtaining Simultaneous and Reliable Concentration and Particle Size Determination in Two Locations at Different Pressures

Problem Statement

Our client is studying the potential transition of particulate aerosol through microscopic stress corrosion cracks (SCC) that can develop over time in storage containers. These sealed metal storage cylinders contain hazardous material and are pressurized with an inert gas.

Performance of the storage cylinders had been conducted using a manufactured representation of typical SCC's. This engineered microchannel was installed on a pressurized cylinder that will be seeded with a surrogate particulate aerosol. The aerosol penetration for the microchannel was assessed by determining the concentration and particle size of a surrogate aerosol, both upstream and downstream of the microchannel.

Aerosol measurement had been undertaken using two identical competitor sourced instruments but these instruments are designed to take an aerosol sample from environments at atmospheric pressure so pressure reduction using a Mass Flow Controller was required to collect the upstream aerosol sample.

In addition, differences in the response to the same presented concentration and particle size by the competitor instruments was presenting the research group with challenges with respect to the interpretation of the results.

CH Technologies Supplied Equipment

After discussions with the research leaders, CH Technologies scientists and engineers recommended replacement of the measurement platform with the Palas Promo® 3000 HP.

This device is a white light-scattering aerosol spectrometer system for particle size analysis and concentration determination that is equipped with two Welas® aerosol sensors for a quasi-simultaneous aerosol measurement. The aerosol measurement can be done at iso-thermal and iso-baric conditions in ranges of 10°C to 120°C and 2barg to 10barg respectfully.

The system employs a single light source and photo-multiplier. Use of these individual components ensures the spectrometer provides directly comparable responses at locations that are up to 180 feet apart.

CH Technologies Customer Support

Integration of external mass flow controllers and an external vacuum pump was required for this system. This provided a constant volumetric airflow through the aerosol sensors while the storage cylinder reduced in pressure as gas escaped through the microchannel during testing.

A CH Technologies engineer provided on-site installation and training on the Promo 3000 instrument specially setup for this application.



Palas Promo® 3000 with Twin Welas® Sensors

When presented with the same aerosol atmosphere the response of the two Welas sensors had an excellent alignment with one another. Simultaneous aerosol measurement in both atmospheric pressure (downstream) and at pressure that was slowly decaying from ~10 barg down to atmospheric (upstream) on a single instrument was made possible.

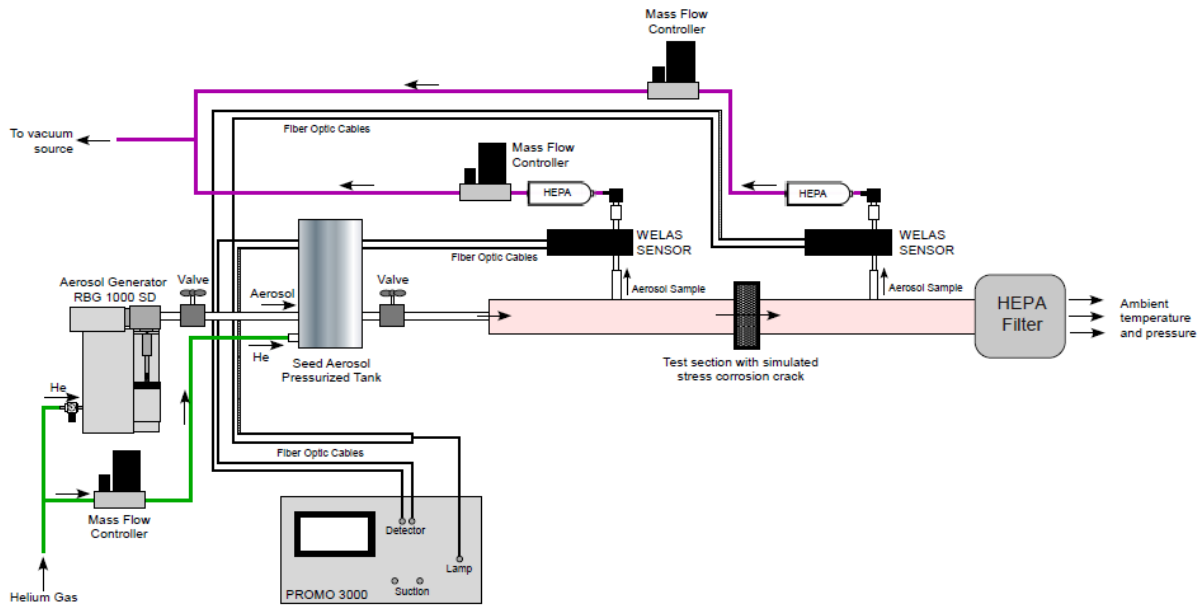
Customer Outcome

For this setup, the previously employed competitor platform was upgraded, at a fraction of the replacement cost of the two original instruments.

The adoption of the Palas Promo 3000 HP with two Welas 2200 HP sensors supplied by CH Technologies permits simultaneous sampling from two locations with stability that can only be provided by instruments employing a single light source and photo-multiplier.

With the extremely high particle size resolution provided by 256 raw data channels, determination of aerosol mass penetrating through the engineered microchannel could be done accurately and reliably.

Future studies are being planned to measure engineered microchannels with different features along with lab-grown SCC's.



Schematic of Test Platform



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