



Your plant meets environmental standards.

The Environmental Protection Agency (EPA) licenses all discharges from factories, mines and quarries in Queensland. New plants must meet minimum standards prior to start up and must be licensed by the EPA. It randomly checks these facilities and it has the power to shut them down if the output exceeds agreed standards.

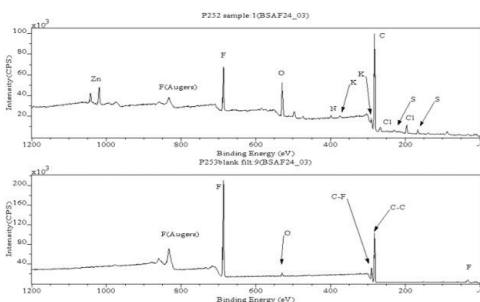
Recently, a new galvanizing plant approached the EPA for a license to operate. In order to gain this license the plant needed to prove to the EPA that it was not exceeding the limits of zinc oxide emissions being discharged from its smoke stacks.

Simtars is an independent testing facility which measures industrial emissions. They have considerable experience in the measurement of airborne particulates, such as dusts. Realising the need for specialist assistance with this project, Simtars approached the Future Materials' facility at the University of Queensland, which recommended a simple but effective new approach.

A new methodology was developed, which employed an inert media such as Teflon membrane to capture the particles in the air borne emissions. Now the identities and quantities of the oxides could be measured on the surface of the Teflon membrane using XPS (X-Ray Photoelectron Spectroscopy) surface elemental analysis. And because of the surface sensitive nature of XPS chemical analysis, only about 50 atomic layers were required to generate useful data.

Further, not only was the XPS method able to determine elements present, but also gave an insight into the chemistry of the elements present, such as the oxidation state.

Conventional measuring techniques were able to identify elemental composition, however were not able to give an insight into the chemistry of the oxide emissions. Further, existing technology required the destruction of the sample in acid digest, whereas the new approach is a non-destructive method of analysis such that the sample can be stored and interrogated further if the need, such as a legal issue, arises.



X-Ray Photoelectron Spectroscopy (XPS)

Surface analysis by X-Ray Photoelectron Spectroscopy (XPS) is accomplished by irradiating a sample with X-Ray photons and analysing the energy of the emitted electrons. The key components of an XPS machine are a high vacuum chamber, X-Ray source, X-Ray monochromator, ion gun and energy analyser.

XPS is widely used to determine the chemical composition and to characterise the chemical state of the surface of materials. XPS can be used for all materials that can be subjected to an ultra-high vacuum.