

Ion beam analysis of 3 DRUM aerosol sampler strips

E Stelcer, A Atanacio, D Cohen, R Siegele, D Garton
and P Drewer

ANSTO, Institute for Environmental Research, PMB 1, Menai, NSW 2234, Australia

Since 1991 ANSTO's IBA laboratory has been sampling fine atmospheric particles every Wednesday and Sunday at urban and rural sites in New South Wales. Multi-elemental accelerator-based ion beam analysis (IBA) techniques were used to characterise major components and significant trace elements with minimum detectable limits close to and below 1 ng/m^3 . Recently we have started testing a 3-DRUM sampling unit kindly obtained from the University of California, Davies, (UCD) USA as a potential addition to our conventional aerosol sampling units. The 3-DRUM sampling unit utilises a modified rotating Lundgren-Type impactor offering several advantages over our current filtration sampling units. The most important advantage of an impaction system compared with a filtration system is that two key aerosol parameters, size and composition, can be simultaneously determined. The 3-DRUM system also has additional benefits of time resolution and multiple sampling which allows significantly longer unattended operation. We see these as major advantages for potential use in remote sampling locations where the sampling site may be difficult to service regularly. To apply ion beam analysis on DRUM strips, the strips has been mounted on separate frames and scanned with 2 by 5 mm proton beam of 2.6 Mev energy, 3uC charge and 10 nA current in a steps of 1mm. A total of 540 PIXE, 540 PIGE and 540 PESA spectrum were collected in a scan process. For analysis and alignment of the obtained elemental concentration of aerosols collected from each strip, a new computer program was developed and the results have been compared with results obtained from the conventional aerosol sampler located side by side with 3 DRUM sampler.

Key words: 3 DRUM aerosol sampling unit, IBA techniques, Trace elements and Elemental concentrations of aerosols.