

Applications of an energy dispersive miniprobe multielement analyser (EMMA) in an anthropogenically affected area

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The EMMA is an energy dispersive miniprobe multielement analyser. The advanced prototype EMMA instrument, using a monochromatic X-ray source based on a Mo fine focus X-ray tube installed in a vintage Phillips PW1410 generator, a Baltic Scientific Si(Li) detector and a specially designed pulse-processor card. This instrument was constructed on site.

The EMMA instrument offers rapid, non-destructive, sensitive, multielement analyses of trace elements including As, Br, Cr, Cu, Hf, Ga, Ge, Mn, Ni, Pb, Rb, Se, Sr, Th, U, Y, Zn. In general, detection limits are typically 1 µg/g or less in biological samples (e.g., plant materials) and 10 µg/g in inorganic materials (e.g., silicate minerals).

To date the EMMA has been tested and calibrated with a range of geological and soil reference materials as well as vegetation reference materials. Materials analyzed include; cattails, ferns, leaves, moss, mushrooms, road sediment, soil and tailings. A preliminary analysis of particle fallout on snow has also been carried out on filters. Protocols are currently being developed to enable chemical analyses for heavier elements on both whole filters and particle separates 20 µm or greater.

Results acquired to date have been utilized in several undergraduate and graduate projects. This data will be used to research further the anthropogenic particulate fallout and the effects of remediation and reclamation efforts in the City of Greater Sudbury.

