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Analysis of Atmospheric Aerosols Collected in an Urban Area in Upstate NY Using Proton Induced X-ray Emission (PIXE) Spectroscopy[1]

JEREMY SMITH, SALINA ALI, BENJAMIN NADARESKI, ALEXANDREA SAFIQ, JOSHUA YOSKOWITZ, SCOTT LABRAKE, MICHAEL VINEYARD, Union College — We examined atmospheric aerosol samples collected in Schenectady NY for evidence of pollution. We collected aerosol samples using a nine stage cascade impactor which distributes the particulate matter by aerodynamic size onto 7.5 μm Kapton foils. We then used a 1MV electrostatic Pelletron accelerator to produce a 2.2MeV proton beam to hit the impacted foils. X-ray intensity versus energy spectra were collected using an Amptek x-ray detector where the x-rays are produced from the proton beam interacting with the sample. This is called PIXE. The elemental composition and concentrations of the elements present in the aerosol samples were determined using a software package called GUPIX. We have found elements ranging from Al to Pb and in particular have found significant amounts of Pb and Br on some of our impacted foils, with a Br/Pb ratio of 0.6 $\pm$ 0.2 which agrees with previous studies. This result suggests the presence of leaded aviation fuel perhaps due to the proximity of the collection site to a small airport with a significant amount of general aviation traffic.

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