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Determination of lead in gunshot residue using anodic stripping voltammetry**Magdalena Wajrak**

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Lead is a naturally occurring element in the Earth's crust, which is known to negatively affect human health and can destroy ecosystems. Lead enters the body primarily through inhalation of lead containing dust and accidental ingestion. One common source of lead in the environment is from gunshot residue. The gunshot residue is a by-product of the reaction in the primer mix. The primer mix in bullets contains lead styphnate, barium nitrate, antimony sulphide, and these chemicals are all present in gunshot residue. Environments with high levels of gunshot residue, like shooting ranges, contain high levels of lead, and so measuring the lead in these environments is essential. Currently lead in gunshot residue can be determined by inductively coupled plasma (ICP) and scanning electron microscopy (SEM), however, these instruments are all laboratory based and significantly expensive. A portable instrument that can quickly and accurately assess gunshot residue samples in the field would be a useful tool in reducing the risk of lead exposure. Voltammetry can be a solution to this problem. This investigation compared ASV technique to ICP-MS in order to validate the ASV as a potential method for lead detection in gunshot residues. The linearity, repeatability and limit of detection that were determined pertained to the accuracy and precision of the instrument; only creating a 1% error of uncertainty, having a linear correlation which has an R² of above 0.999 and being able to detect lead as low as 0.01 ppb concentration. Gunshot residue samples were analysed by both ICP-MS and ASV, and this created a correlation of 0.995 for all samples. ASV is a suitable method in determining the concentration of lead in gunshot residue.

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