

## **Trace Metals Speciation in Water Samples by Sequential Injection Anodic Stripping Voltammetry with Monosegmented Flow and On-line UV Digestion**

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A cost-effective sequential injection system incorporating with an on-line UV digestion for decomposing of organic matters before the determination of Zn(II), Cd(II), Pb(II) and Cu(II) by anodic stripping voltammetry (ASV) on a hanging mercury drop electrode (HMDE) using a small scale voltammetric cell was developed. The simplest voltammetric speciation was investigated by separation of the metal species into two groups: labile and inert. The labile species can be detected by direct ASV. The total metal was measured after destruction of dissolved organic matter by on-line UV digestion. A low-cost small scale voltammetric cell using a HMDE as a working electrode was fabricated from disposable pipet tip and microcentrifuge tube. A home-made UV digestion unit was fabricated employing a small size and low wattage UV lamps and flow reactor made from PTFE tubing coiled around the UV lamp. An on-line calibration or a standard addition procedure was developed employing a monosegmented flow technique. Performance of the proposed system was tested for on-line digestion of model water samples to release metal ions from organic complexes such as strong organic ligand (EDTA) or intermediate organic ligand (humic acid). The wet acid digestion method (USEPA 3010a) was used as a standard digestion method for comparison. Under the optimum conditions, deposition time of 180 s, linear calibration graphs in range of 10-300 µg/l Zn(II), 5-200 µg/l Cd(II), 10-200 µg/l Pb(II), 20-400 µg/l Cu(II) were obtained with detection limit of 7.4, 2.7, 5.2 and 3.8 µg/l of Zn(II), Cd(II), Pb(II) and Cu(II), respectively. Relative standard deviation were 4.2, 2.6, 3.1 and 4.7% for 7 replicate analyses of 27 µg/l Zn(II), 13 µg/l Cd(II), 13 µg/l Pb(II) and 27 µg/l Cu(II), respectively. The system was validated by the analysis of certified reference material of trace metals in natural water (SRM 1640 NIST). The developed system was successfully applied for the determination of Zn(II), Cd(II), Pb(II) and Cu(II) in ground water samples collected from the nearby zinc mining area.