

**DETERMINATION OF INSTRUMENT DETECTION LIMIT AND METHOD
DETECTION LIMIT OF VARIAN 55B FLAME ATOMIC ABSORPTION
SPECTROMETER FOR CADMIUM, CHROMIUM, COPPER, IRON, LEAD,
MANGANESE AND ZINC USING SIPS-10 AND MANUAL
SAMPLE INTRODUCTION METHODS**

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ABSTRACT

Determination of Instrument Detection Limit and Method Detection Limit of Varian 55B Flame Atomic Absorption Spectrometer for Cadmium, Chromium, Copper, Iron, Lead, Manganese and Zinc using SIPS-10 and Manual Sample Introduction Methods

Determination of detection limits is an essential measure of performance for a quantitative laboratory, method or analyst. In this study, the Instrument Detection Limit (IDL) and Method Detection Limit (MDL) of F-AAS Varian 55B for cadmium, chromium, copper, iron, lead, manganese and zinc were determined using the SIPS-10 and manual sample introduction methods. For IDL determinations, EPA's SW-846 method (Test Methods for Evaluating Solid Waste and Physical/Chemical Methods) was employed for both sample introduction methods where deionized water was analyzed for twenty times for three non-consecutive days. MDL determinations were done based on the definition given by the United States Code of Federal Regulations (40 CFR part 136, Appendix B - Definition and Procedure for the Determination of the Method Detection Limit). In this procedure, MDL were estimated by calculating the standard deviation from the analysis of a standard solution containing the analyte with a concentration determined from the estimated detection limit, which was also analyzed for twenty times. Results showed that for the determination of IDL, all of the elements have lower values (Cd *0.000887 mg/L*, Cr *0.00435 mg/L*, Cu *0.000128 mg/L*, Fe *0.000816 mg/L*, Pb *0.000742 mg/L*, Mn *0.000985 mg/L*, Zn *0.000585 mg/L*) for the manual method than the SIPS-10 method (Cd *0.00399 mg/L*, Cr *0.0150 mg/L*, Cu *0.00222 mg/L*, Fe *0.00913 mg/L*, Pb *0.0217 mg/L*, Mn *0.00132 mg/L*, Zn *0.00445 mg/L*). For MDL, the results showed variations for both the two sample introduction methods. The MDL values for cadmium, chromium, copper, iron, lead, manganese and zinc are *0.0374 mg/L*, *0.0235 mg/L*, *0.00203 mg/L*, *0.0197 mg/L*, *0.0805 mg/L*, *0.00325 mg/L* and *0.00686 mg/L* in the manual method, respectively and *0.0101 mg/L*, *0.0429 mg/L*, *0.00280 mg/L*, *0.0186 mg/L*, *0.197 mg/L*, *0.00312 mg/L* and *0.0103 mg/L* in the SIPS-10 method, respectively. Both methods have comparable precision for copper, iron, manganese and zinc determinations while SIPS-10 method is more precise for cadmium, chromium and lead analysis.