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"EVALUATION OF AIRBORNE SOURCES OF CHROMIUM IN AN INDUSTRIAL AREA OF SANTA FE, ARGENTINA"

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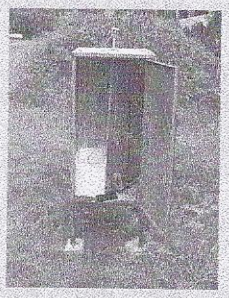
INTRODUCTION

There are several methods available for chromium speciation in environmental samples. However, the relatively high detection limits make these methods unsuitable for the determination of ultra-trace levels of airborne Chromium(VI). The sampling and analytical methods for detecting hexavalent chromium under ambient conditions are a challenge due to the very low concentrations expected, interferences and the potential for interconversion of the chromium species. A new analytical procedure for determining ultra-trace levels of chromium in air has been evaluated and applied at different places near an industrial area.

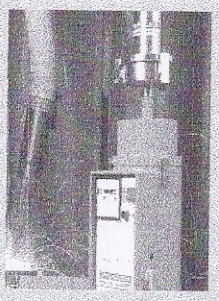
The study was undertaken in Esperanza City, which is located in Santa Fe Province, Argentina.

EXPERIMENTAL

Sample Collection



Air is drawn at a rate of 15Lmin over a continuous 48-h period through three 500 mL glass Greenburg-Smith impingers (in line) filled with 0.02 N sodium bicarbonate buffer solution for the hexavalent form.



Particulate matter from ambient air is collected on glass fiber filters using a high-volume sampler (**Gravikon VC 25**) The high-volume sampler must be capable of sampling at an average flow rate of 22,5 m^3/min. Constant air flow is maintained by a mass flow controller over a 6-hr period.

Extraction

Quantitative extraction of Chromium(VI) from the solutions was observed with APDC/MIBK. Samples collected on glass fiber filters was extracted by hot acid procedure for Total Chromium determination.

Determination

The trace element concentrations in each sample was determined by atomic absorption spectrometry. The limit (MDL) was found to be 0.46 x 10^{-2} µg.L^{-1} for Chromium (VI) and 0.15 x 10^{-2} µg.L^{-1} for total Chromium.

RESULTS

Period: March 2002 – February 2003

	Cr (VI) Sampling 48-h *D.L: 0.46.10⁻³ mg/m³*				Cr Total Sampling 48-h *D.L: 0.15.10⁻³ mg/m³*			
MONTH	Location # 1	Location # 2	Location # 3	Location # 4	Location # 1	Location # 2	Location # 3	Location # 4
March	ND	ND	ND	ND	0,000026	0,000044	0,000026	0,000015
April	ND	ND	ND	ND	ND	ND	ND	ND
May	ND	ND	ND	ND	ND	0,0000163	0,0000211	0,0000422
June	ND	ND	ND	ND	ND	0,0000170	0,0000254	0,0000267
July	ND	ND	ND	ND	0,000053	ND	0,0000500	0,0000257
August	ND	ND	ND	ND	ND	ND	ND	ND
September	0,000135	ND	ND	ND	ND	ND	ND	ND
October	ND	ND	ND	ND	ND	0,000033	ND	0,000027
November	ND	ND	ND	ND	ND	ND	ND	ND
December	ND	ND	ND	ND	ND	ND	ND	ND
January	ND	ND	ND	ND	ND	ND	ND	ND
February	ND	ND	ND	ND	ND	ND	ND	ND

CONCLUSIONS

- ✓ The results of this study have shown that the proposed method is applicable to monitoring toxicological risk levels of chromium in air.
- ✓ This method has been modified for the chromium speciation in environmental samples at ultra-trace levels.

REFERENCES

- ✓ Method IO-3.2 - Determination of Metals in Ambient Particulate Matter Using Atomic Absorption (AA) Spectroscopy (US-EPA)
- ✓ D5281-98 - Standard Test Method for Collection and Analysis of Hexavalent Chromium in Ambient Atmospheres (ASTM).
- ✓ Yarong Li., Narayan K., Pradhan A. and Low K. *Talanta* 2002, 1143-1153