ENVIRONMENTAL IMPROVEMENTS BEFORE THE CHALLENGE OF THE NEW DIRECTIVE REGULATING As, Cd AND Ni CONCENTRATION LEVELS IN AMBIENT AIR

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1. INTRODUCTION

A study has been conducted of the levels of As, Cd and Ni of the atmospheric PM_{10} particulate fraction, in three towns of the Castellón ceramic cluster (Alcora, Castellón and Vila-real) with a view to running a "check" prior to the entry into force of directive 2004/107/CE, on 31 December 2012, which will legislate the concentration levels of these elements in ambient air.

Figure 1. Geographic situation of the study localities.

Arsenic, cadmium and nickel can have a natural origin in biological processes, re-suspended soil particles, volcanic activities, forest fires and sea breezes. However, industrialisation causes most of their concentrations in the atmosphere to stem from human activity. The anthropogenic origin of these elements is associated with the raw materials used in the local industry, traffic and in the case of arsenic also to fossil fuel combustion. In the present study the values of the concentrations of the three chemical elements under study were obtained in the years 2001 to 2004, and the variation of these values in this period of time has been analysed.

2. METHODOLOGY

The samples have been captured daily using a Kleinfiltergerät IND-LVS3 instrument. This sampler, considered a reference sampler according to European standard UNE-EN 12341:1999, enables obtaining the PM_{10} particulate concentration present in the local atmosphere. The samples were then digested in acid medium to prepare them for chemical analysis by means of the ICP-MS technique. A Hewlett Packard, model 4500, instrument has been used in the analysis, belonging to the Central Services of Universitat Jaume I

3. RESULTS AND CONCLUSIONS

The results obtained are detailed in tables 1, 2 and 3.

Element	Limit value	Real value Alcora station			
		2001	2002	2003	2004
As	6.0	19.0	16.0	8.7	5.5
Ni	20.0	4.0	7.5	2.5	2.7
Cd	5.0	2.0	2.3	1.0	1.4

Table 1. Annual values of As, Cd and Ni in ng/m³ obtained in Alcora.

Element	Limit value	Real value Castellón station			
		2001	2002	2003	2004
As	6.0	9.6	7.8	3.7	2.5
Ni	20.0	4.4	4.4	3.2	4.0
Cd	5.0	0.9	1.4	0.8	1.4

Table 2. Annual values of As, Cd and Ni in ng/m³ obtained in Castellón.

Element	Limit value	Real value Vila-real station			
		2001	2002	2003	2004
As	6.0	16.0	15.0	9.8	4.0
Ni	20.0	6.1	5.6	3.9	4.9
Cd	5.0	1.8	2.4	1.3	2.0

Table 3. Annual values of As, Cd and Ni in ng/m³ obtained in Vila-real.

In general the lowest concentrations of the studied elements are recorded at the urban station of Castellón. On the other hand, no clear tendency is observed in the evolution of the Cd and Ni concentrations throughout the years of study in the three towns. However, a gradual and important reduction in As concentrations, a problematic element in the study area, can be observed, which has led it in the last year of measurement below the limit value to be legislated for this element. This fact is a favourable result of the greater control of the As emissions into the atmosphere and of the implementation of corrective measures in which the administrations, the social players, and of course the companies from the sector have contributed.

4. ACKNOWLEDGEMENTS

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