

Determination of PCDD/Fs and PCBs in PM₁₀ air samples by using the DRE-CALUX bioassay

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Abstract:

BACKGROUND: When compared to the European Guidelines, PM₁₀ concentrations in Algeria are often exceeding the maximum limits, and in general no information exists on the compounds bound on its surface.

OBJECTIVES: The objective of this study was to measure the dioxin-like pollutants (PCDD/Fs and dioxin-like PCBs) in the PM₁₀ fraction at the Sour El Ghozlane cement plant in Algeria.

METHODS: PM₁₀ samples (n=23) were taken between 24 March and 15 April 2013, using a medium volume sampler and 47 mm PTFE filters. The 24h samples were dried to determine the PM₁₀ content and afterwards extracted, cleaned up and analyzed with the CALUX bioassay.

RESULTS: Our results showed that the measured Bioanalytical Equivalent (BEQs) were rather low, similar to other international industrial sites worldwide. The PCDD/Fs and dl-PCBs were positively correlated ($\rho=0.6$, $p=0.002$), indicating they have similar sources. Furthermore, samples taken in March and mid-April showed a different pattern, with March samples with significantly higher PCDD/Fs, dl-PCBs and humidity, lower temperatures and no difference in PM₁₀ concentrations compared to April samples. These results reveal that PM₁₀ alone is not a good proxy and that meteorological conditions are an important factor in assessing dioxin-like pollution in the atmosphere.

CONCLUSIONS: It seems that at present there is no health hazard through direct airborne human exposure to dioxin-like pollutants in PM₁₀ from this site. However, it is important to monitor these POPs for a longer period of time and also to gain more insight in their distribution between the particulate and gas-phase in relation to meteorological conditions.

Keywords

PCDD/Fs; PCBs; CALUX; PM₁₀, Algeria

References:

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