NEW ANALYTICAL METHODOLOGY FOR DETERMINING ATMOSPHERIC PERSISTENT ORGANIC POLLUTANTS THROUGH XAD ABSORPTION

Pasquale AVINO\textsuperscript{1}, Giuseppe CINELLI\textsuperscript{2}, Ivan NOTARDONATO\textsuperscript{2} and Mario Vincenzo RUSSO\textsuperscript{2}

\textsuperscript{1}Chemical Laboratory, DIPIA-ISPEL, via Urbana 167, 00184 Rome, Italy
(pasquale.avino@ispesl.it; Ph.: +39-06 4714242; Fax:+39-06 4744017)
\textsuperscript{2}Facoltà di Agraria, Università degli Studi del Molise, via De Sanctis, 86100 Campobasso, Italy

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Among different atmospheric Persistent Organic Pollutants (POPs) Polycyclic Aromatic Hydrocarbons (PAHs), benzene, toluene and xylenes (BTX) and pesticides (aldrin, dieldrin, endrin, dimethoate, endosulfan, omethoate) need particular attention for their characteristics to be persistent, bioaccumulative and toxic. Basically, all of them are of anthropogenic origin. In particular, the PAHs are characterized by high chemical stability and carcinogenic properties and are due mostly to incomplete combustion processes such as domestic heating, thermal power plants, urban solid waste incineration and autovehicular traffic.

This communication would like to propose a new rapid, precise, accurate and inexpensive methodology for sampling and determining some atmospheric POPs using adsorbent polymers. The porous polymers more used such as Tenax, Porapak, Chromosorb and the PUF and XAD resins are relatively inert, hydrophobic, and generally develop a high surface area. Many porous polymers retain the low volatile compounds and are specific to different classes of compounds.

In this communication the results of a study on the performance of the apolar synthetic absorbent, amberlite (XAD-2), in the enrichment of different organic species present in atmosphere at trace levels, are reported.

Before applying this new analytical methodology to air samples, it was widely investigated in laboratory: the sampler is constituted by a glass pyrex vial home-filled with 270 mg of XAD-2 (sampling) and 120 mg of XAD-2 (for checking). The re-extraction is performed by C\textsubscript{2}H\textsubscript{2} (2 mL) or methanol. Before each analysis an Internal Standard was added. The GC analysis was performed by a gas chromatograph mod. 86.10 HT (Dani, Monza, Italy) equipped with a Programmable Temperature Vaporizer (PTV) injector and FID and ECD detectors. The silica fused capillary column (SE-54, 25 m×300 μm×1.2 μm) was Chrompack (Palo Alto, CA, USA); the gas carrier was hydrogen.

The results obtained show that the amberlite, and particularly XAD-2, can be easily used for sampling organic compounds present at trace levels in atmosphere with big advantage compared with popular adsorbents such as Tenax, Porapak and Chromosorb. One of the advantages is the high volume of sampled air with high concentration factor and limited loss of analytes (breakthrough volumes range between 300 and 1250 L). Another advantage is the possibility of easy and speed re-extraction of analytes using small volumes of solvent (few mL) with recovery ranging between 77\% and 109\% and standard deviation <10.