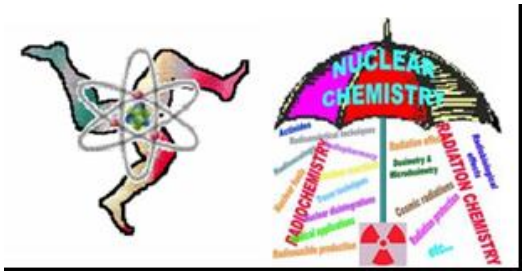

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Determination of short-lived radionuclides in neutron-activated urban atmospheric Particulate Matter

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Many studies have focused their attention on the determination of elements of toxicological and environmental interest in atmospheric particulate matter using analytical techniques requiring chemical treatments. The Instrumental Nuclear Activation Analysis (INAA) technique allows to achieve high sensitivity, good precision and excellent limit of detection without pre-treatment, also considering the problems related to the radioisotope characteristics (e.g., half-life time, interfering reactions, spectral interferences).
In this communication elements such as Al, Br, Cl, Cu, I, Mg and V, are studied in atmospheric PM10 sampled in downtown Rome: the relative radionuclides are characterized by short half-lives (ranging from 2.31 to 37.9 min). Further, As, La, Mn and Sb were also determined for evaluating the toxicological aerosol characteristics. Samples and standards were irradiated for 20 min in the pneumatic channel of the TRIGA Mark II nuclear reactor of Casaccia ENEA, at a total neutron flux of 1.25×1013 n×cm-2×s-1; the γ-measurement times were 10 and 80 min according to the radioisotope properties.
The results, elaborated considering the matrix effects and the interfering reaction contribution to the radioisotope formation (e.g., 28Al generated by (n,γ) reaction from 27Al and by (n,p) reaction from 28Si), show interstring values of As (0.3-6.1 ng m-3), Cu (22-313 ng m-3), Mn (17-125 ng m-3), V (7-63 ng m-3), higher than those determined in an area not influenced by autovehicular traffic. The other elements show a pattern similar to the very few data present in literature. It should be underlined the good correlation of Al vs Mg (0.915) and La (0.726) indicating a same sources for these three species, whereas the Br-Sb trend shows a minor correlation (0.623) meaning different contributions to their levels.

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