

THE OCCURRENCE OF SELECTED TRACE ELEMENTS IN GRAIN FRACTIONS OF DUST EMITTED FROM POWER, COKE AND CEMENT PLANTS

JAN KONIECZYŃSKI, KATARZYNA STEC

Abstract: The emission of dust from power and industrial sources introduces a lot of contaminants into the air, including compounds of trace elements contained in fuels and raw materials. They are contained in respirable dust particles, creating hazard to human health. The results of investigations into the occurrence of selected trace elements in PM₁, PM_{2.5} and PM₁₀ fractions of dust emitted from coal-fired boilers equipped with air protection devices such as cyclone, electrofilter, wet and dry-scrubbing FGD plant have been presented. Dust emitted from a coke battery (battery heating) and rotary kiln for cement manufacture was also subjected to research. The research material was taken by means of a cascade impactor, enabling a fraction of different grain size dust to be separated from a stream of dust collected in an electrofilter. The ICP-AES method (of atomic emission spectrometry (AES) with plasma excitation) was used to determine the trace elements after prior mineralization of samples by microwave method. The results of measurements and analyses were presented by determining the ranges of trace elements occurrence in flue dust and emission factors in PM_{2.5}. It was found out that big utility boilers and rotary kilns in the cement industry which are equipped with air protection devices meeting BAT requirements do not contaminate the air with dust and dust-related trace elements in the amounts that could create hazard. Excessive emission of dust, including a respirable fraction is still observed in the case of municipal heating plants equipped solely with mechanical dust separators (cyclones). Metallurgical units have an effect on a smaller scale, but require continuous monitoring. Coke battery heating does not pose danger due to small range of influence.