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DOCTORAL DISSERTATION SUMMARY

# ”*Analysis of the Trace Amount of Volatile Organic Compounds (VOC) in Office Work Environment with the Use of Thermal Desorption Combined with Capillary Gas Chromatography”*

The aim of the dissertation is to show the sources of selected volatile organic compounds emission into the office air with a particular focus on halogenated compounds. The experimental part of the work consisted in identifying and quantifying emitted organic compounds in samples of finishing materials and the elements of office equipment. The analysis of presence of volatile organic compounds in the air of selected offices was carried out.

The mixture of chemical pollution emitted by sixteen samples of synthetic materials taken from the elements of office equipment or finishing materials and seven office printing and copying devices during their work were analysed. The analysis was carried out on simulators of environment conditions (glass cell and test chamber). Air samples were taken into commercial three-layered adsorption tubes (Tenax, Carbograph 1TD and Carboxen 1000). The identification of emitted organic pollutants was carried out with the use of thermal desorption (TD) combined with capillary gas chromatography coupled with mass spectrometry (GC/MS). The levels of concentration and specific rate of halogenated compounds emission and other volatile organic compounds (benzene, toluene, ethylbenzene, xylenes) were compared. Synthetic materials examined and office printers and copiers were the sources of emission of halogenated organic compounds such as: chlorobenzene, dichlorobenzenes, tetrachloroethene and trichloroethene into the offices' air.

Office work environment was also examined with regard to the presence of volatile organic compounds, taking into account the type of ventilating systems used in different office buildings in Warsaw. The analysis of air samples taken in offices did not show the excess of admissible concentrations of volatile organic compounds permitted by law for offices in Poland. The determination of the sum of volatile organic compounds allowed to obtain a more detailed information about working environment conditions in these offices. In 35% of the offices with natural ventilation the determined sum of VOCs exceeded the

suggested limit of 300 μg $m^{-3}$. In the assessment of air quality of office buildings in Poland, apart from admissible concentrations, the sum of volatile organic compounds also needs to be taken into account.

The research supported the thesis that different synthetic materials used in offices and office printers and copiers can be the source of halogenated volatile organic compounds in the air of office workplaces.