SOURCE APPORTIONMENT ANALYSIS OF AIRBORNE VOCs USING POSITIVE MATRIX FACTORIZATION IN MAPTAPHUT, THAILAND

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ABSTRACT

Emission sources of volatile organic compounds (VOCs) were determined in this study. Monitoring data of airborne VOCs, measured by the Pollution Control Department from January 2009 to December 2013 in Maptaphut and Dindaeng (Bangkok) area were analyzed using a Positive Matrix Factorization (PMF) model to identify and elaborate their source profile.

Spatial evaluation of the PMF model indicated that the source profiles could be categorized into eleven factors for compositions of VOCs in both areas. Based on their contribution, emission sources of VOCs in the Maptaphut area were grouped into three to five categories. Mobile sources contributed about 42 to 57% of total VOCs, industrial sources 15 to 44% of total VOCs and chemical use in households, 3 to 10% of total VOCs for Maptaphut and Dindaeng, respectively.

Temporal analysis by the PMF model was carried out by comparing the measured data in the year 2011 and the year 2013. Results from the PMF analysis revealed that there were three to five groups of emission sources, which contributed to total VOCs concentrations. The mobile sources' contribution was about 49.7%, 43.4% of total VOCs, while the industrial sources' contribution was about 27.8% and 24.1% of total VOCs in 2011 and 2013, respectively. Major emission sources of VOCs in the Maptaphut area appeared to be both from mobile and industrial sources. It was also found that concentrations of VOCs in 2013 were lower than those measured in 2011.

Therefore, an effort to control both mobile and industrial emission sources should be implemented for solving the VOCs problem in the Maptaphut area.

KEY WORDS: VOLATILE ORGANIC COMPOUNDS (VOCs) / POSITIVE MATRIX FACTORIZATION (PMF) / SOURCE APPORTIONMENT/ MAPTAPHUT

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