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DISPERSION OF VOLATILE ORGANIC COMPOUNDS IN THE VICINITY OF PETROLEUM PRODUCTS STORAGE TANKS

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Abstract

Hydrocarbon storage tanks are important sources of emission of volatile organic compounds (VOCs) which have unfavorable effects on atmospheric chemistry and human health. The aim of this study is to calculate the emission of VOCs with emphasis on benzene, toluene, ethylbenzene, and xylene (BTEX) from storage tanks in the export port of Abadan petroleum refinery company in Mahshahr, Iran. The rate of VOCs emission from 32 external floating roof storage tanks containing 7 different types of organic liquids was calculated using TANKs 4.0.9d software in hot and cold seasons. Then, the dispersion of these pollutants was analyzed by implementing AERMOD model. Field measurement was performed in 6 points in the study area in hot and cold seasons to validate AERMOD modeling results. Results show that maximum quantities of benzene (0.0649 g/s) and ethylbenzene (0.0189 g/s) were emitted from light naphtha storage tanks, and maximum quantities of toluene (0.1635 g/s) and xylene (0.0593 g/s) were emitted from gasoline storage tanks in the hot season. Also, in the cold season, maximum emission of benzene (0.0335 g/s) observed from jet naphtha storage tanks, ethylbenzene (0.0093 g/s) from light naphtha storage tanks, and toluene (0.0826 g/s) and xylene (0.0314 g/s) from gasoline storage tanks. In 8-h and 24-h emissions of BTEX pollutants in the export port area, the most polluted points were identified as points 5 and 6 in the hot season and points 2 and 4 in the cold season. The highest BTEX emission rate was related to gasoline tank #14 with 0.2927 g/s in the hot season and 0.1497 g/s in the cold season. Comparison of predictions of the model with the measurements showed that mean value of absolute average relative deviation (AARD) was between 7-16% which indicates that an acceptable modeling was performed.

Keywords: AERMOD, air dispersion modeling, BTEX, emission factor

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