

## Perchloroethylene Analysis by Chemical Oxidation and Determination of Intermediate Products by Gas Chromatography, Mass Spectrometry

**Sadeghi, M. (PhD)**

Assistant professor of Environmental Health Engineering, Environmental Health Research Center, School of Public Health, Golestan University of Medical Sciences, Gorgan, Iran

**Naddafi, K. (PhD)**

Professor of Environmental Health Engineering, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran

**Nabizadeh, R. (PhD)**

Professor of Department of Environmental Health Engineering, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran

**Corresponding Author:** Sadeghi, M.

**Email:** mahdikargar1@gmail.com

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**Abstract**

**Background and Objective:** Perchloroethylene (PCE) is a chlorinated hydrocarbon used as a solvent in many industrial processes. In contaminated water and soil a great deal of PCE is found. This study aimed to determine the rate of decomposition of PCE occurred after advanced oxidation.

**Material and Methods:** In this descriptive-analytic study conducted (2011) in public health faculty of Tehran University of medical sciences, gas chromatographic was used to measure PCE and gas chromatography - mass spectrometry for intermediate products. Chemical oxidation involves ultrasonic waves, ultraviolet light and hydrogen peroxide.

**Results:** PCE was effectively decomposed by advanced oxidation processes. In these processes, the reaction rate was based on the equation of the first order and the rate of decomposition was proportional to the concentration. The higher was hydrogen peroxide, the more was decomposition, and the removal rate was higher at acidic PH. The intermediate products formed in the oxidation process were trichlorethylene, dihllorethylene, trichloroacetic acid, dichloroacetic acid and chloroacetic acid.

**Conclusion:** The toxicity of intermediate products formed by degradation of Perchloroethylene compared to its initial toxicity is low. But it is a necessity to elongate the processes for having complete destruction of intermediate compounds and preventing from their adverse effects on the environment and human health.

**Keywords:** Perchloroethylene, Ultrasonic, Ultraviolet, Hydrogen Peroxide, Gas Chromatography, Mass Spectrometry