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Simultaneous Determination of Benzene, Toluene, Ethyl Benzene, xylene (BTEX) and Methyl *Tertiary*-Butyl Ether (MTBE) in Soil by Headspace Gas Chromatography-Mass Spectrometry.

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A headspace gas chromatography-mass spectrometric assay method was developed for the simultaneous determination of benzene, toluene, ethyl benzene, xylene(BTEX) and methyl *tertiary*-butyl ether(MTBE) in soil contaminated with gasoline. 2g of soil sample were placed in 10 mL vial filled with 5 mL of phosphoric acid solution (pH 2) saturated with NaCl, and the solution was spiked with fluorobenzene as an internal standard and sealed with cap. The vial was placed in a heating block for 50min at 80℃. The detection limits of the assay were 0.1 ng/g for MTBE, benzene, toluene and m-xylene, and, 0.2 ng/g for ethyl benzene, o,p-xylene. A regression line of peak area ratio for target compounds to internal standard on concentration using a least-squares fit demonstrated a linear relationship with correlation coefficient being greater than 0.995. The reproducibility of the assay was very good. For five independent determinations at 10ng/g, the relative standard deviations were less than 10%. The developed method may be valuable to be used to the national monitoring project of BTEX and MTBE in soil.

Table 1. GC-MS conditions for analysis of MTBE and BTEX

Parameter	Condition		
Column	HP-5MS(30m×0.2mmI.D.× 0.25㎛ F.T)		
Carrier	He at 0.9mL/min		
Oven Temp.	35℃ (1 min) → 5℃/min → 70℃ (3 min)		
Split Ratio	1 : 10		
Injector Temp.	250℃		
Transfer Temp.	280℃		
Selected Ion Group	Group	Start Time(min)	Selected Ions, m/z
	1	1.4	41, 57, 73
	2	2.1	78, 96
	3	3.5	91, 92
	4	6.5	91, 106

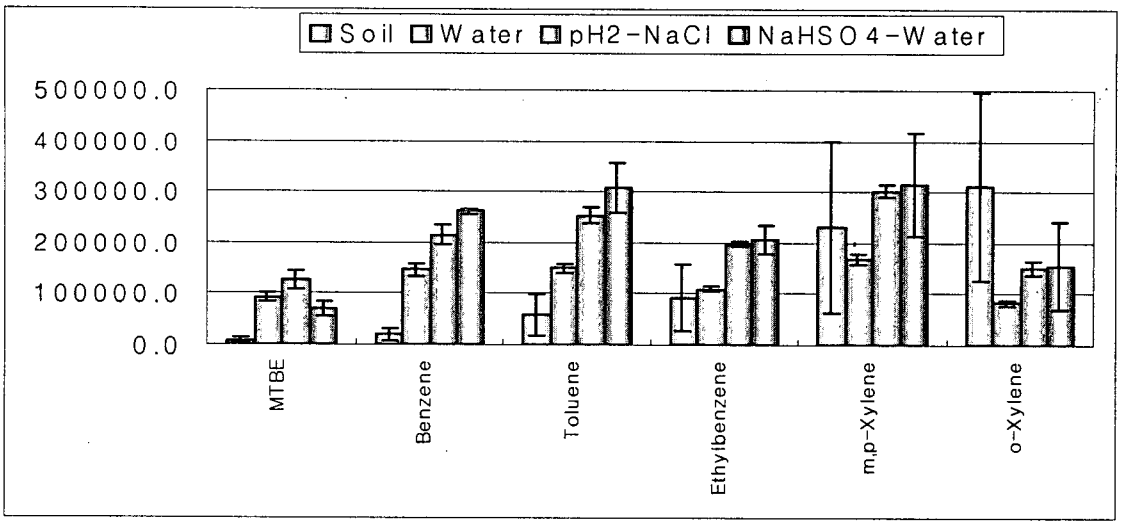

Figure 1. Extraction yield according to several conservation solutions

Table 2. QA & QC results for the analysis of MTBE and BTEX in soil

Compounds	Linear regression	Correlation coefficient	MDL (ng/g)	Spiked Conc.(ng/g)	average± SD (RSD%)
MTBE	Y = 0.0129x + 0.0286	0.9954	0.1	10	9.1 ± 1.3 (13.7)
Benzene	Y = 0.0323x + 0.0367	0.9962	0.1	10	10.9 ± 0.8 (7.3)
Toluene	Y = 0.0512x + 0.1587	0.9958	0.1	10	8.6 ± 0.7 (8.6)
Ethylbenzene	Y = 0.0552x + 0.082	0.9985	0.2	10	9.3 ± 0.6 (6.4)
m,p-Xylene	Y = 0.0800x + 0.1988	0.9963	0.1	10	7.3 ± 0.7 (9.4)
o-Xylene	Y = 0.0465x + 0.0533	0.9983	0.2	10	8.8 ± 0.7 (7.6)