

There are three isomers of xylene: *o*-xylene, *m*-xylene, and *p*-xylene. The JIS standard includes the total content of *o*-, *m*-, and *p*-xylene as 80% or more, and benzene at 0.1% or less, Toluene is defined as 1.0% or less. The purity test of xylene was performed with reference to the calculation method for JIS relative sensitivity.

Measurement procedure

Measure the sample for relative sensitivity and determine the relative sensitivity

$$f_i = \frac{W_s}{A_s} \times \frac{A_i}{W_i}$$

f_i : Relative sensitivity of compound i
 W_s : Mass (g) of Ethylbenzene
 A_s : Peak area of Ethylbenzene
 A_i : Peak area of compound i
 W_i : Mass (g) of compound i

Xylene was measured.

Determine the content of each component

$$C_i = \frac{\frac{A_i}{f_i}}{\sum_{i=1}^n \frac{A_i}{f_i}} \times 100$$

C_i : Amount of compound i contained
 A_i : Peak area of compound i
 f_i : Relative sensitivity of compound i
 n : Number of all the peaks

Determine the purity of xylenes

Preparation of samples for relative sensitivity determination

Weigh *o*-Xylene, *m*-Xylene, *p*-Xylene, Ethylbenzene, Benzene and Toluene to 1g on a balance and mix. Samples were weighed to an accuracy of 1 mg.

	Weight value
<i>o</i> -Xylene	1.0103 g
<i>m</i> -Xylene	0.9999 g
<i>p</i> -Xylene	1.0131 g
Ethylbenzene	1.0035 g
Benzene	1.0046 g
Toluene	1.0026 g

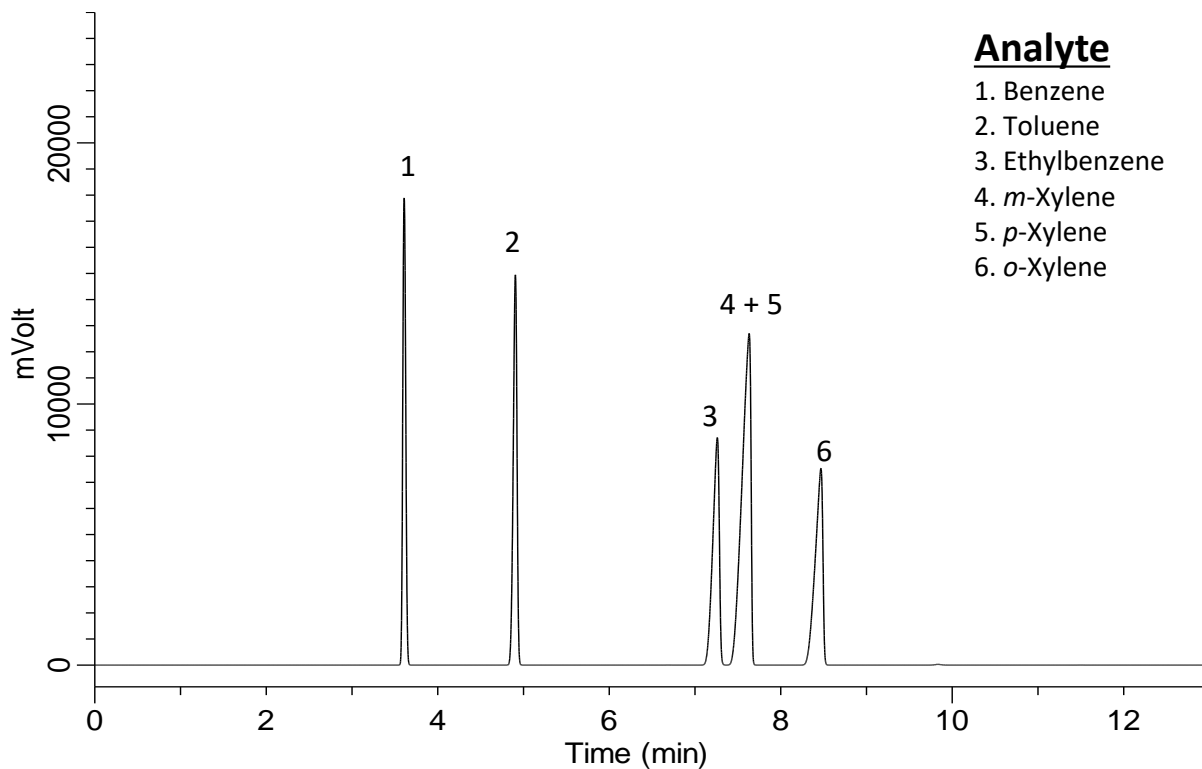
Assay conditions

Conditions

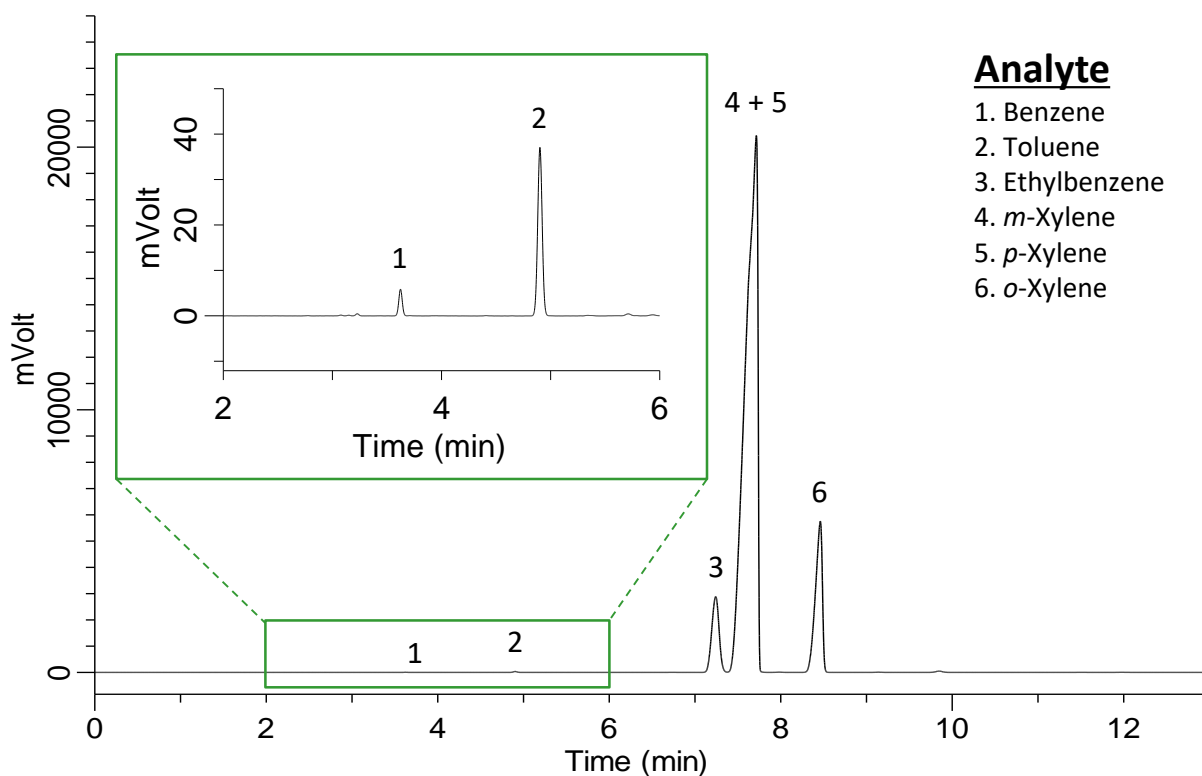
System	: GC - FID
Column	: InertCap 1 0.53 mm I.D. x 30 m df = 1.00 μm
Col. Cat. No.	: 1010-11445
Col. Temp.	: 80 °C (15 min) - 10 °C/min - 180 °C (5 min)
Carrier Gas	: He 3.00 mL/min
Injection	: Split 10:1 200 °C
Detection	: FID Auto Range 200 °C
Injection Vol.	: 0.2 μL
Syringe Size	: 10 μL

Measurement

Chromatogram of the sample for relative sensitivity determination



Chromatogram of xylene



Relative standard deviation

The relative standard deviation was determined for the measurement accuracy of a 0.2 μL injection volume with a 10 μL syringe.

Table 1. Repeatability of area values (xylene, $n = 7$)

	Benzene	Toluene	Ethylbenzene	<i>m</i> -Xylene + <i>p</i> -Xylene	<i>o</i> -Xylene
1 st	13381	108558	17274370	205266413	32586125
2 nd	13098	106438	16946836	201390140	31968917
3 rd	13068	105879	16896183	201112183	31888650
4 th	13092	106011	16854562	200496966	31796033
5 th	13350	108631	17274375	205228799	32595549
6 th	13142	106774	17031437	202445574	32150952
7 th	13185	107261	17098290	203319807	32286799
Ave.	13188	107079	17053722	202751412	32181861
SD	127	1134	171155	1936575	323191
RSD (%)	0.97	1.06	1.00	0.96	1.00

Relative sensitivity to ethylbenzene

Table 2. Relative sensitivity of each component

	Benzene	Toluene	Ethylbenzene	<i>m</i> -Xylene + <i>p</i> -Xylene	<i>o</i> -Xylene
Weight (g)	1.004	1.002	1.003	1.013	0.999
相対感度用試料の面積値	43382675	45604480	45938507	92111131	46622364
相対感度	0.94	0.99	1.00	1.00	1.01

Purity of xylenes

Table 3. The product contains components as shown below

	Benzene	Toluene	Ethylbenzene	<i>m</i> -Xylene + <i>p</i> -Xylene	<i>o</i> -Xylene
含有量(%)	0.0055	0.043	6.8	81	13

The purity of xylenes (sum of the content of *o*-, *m*-, and *p*-xylenes) was 94 %, Benzene content was 0.0055 % and toluene 0.043 %.

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