

Purity Test for Xylene

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

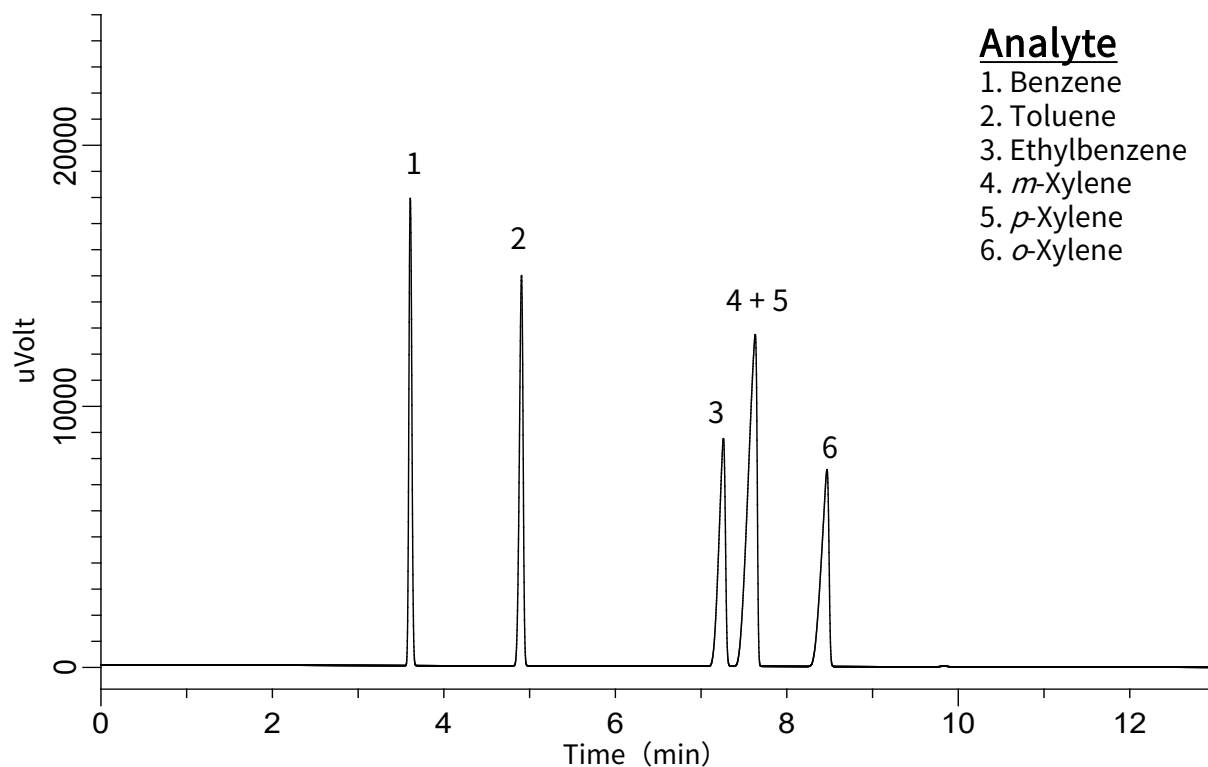
Assay conditions

Conditions

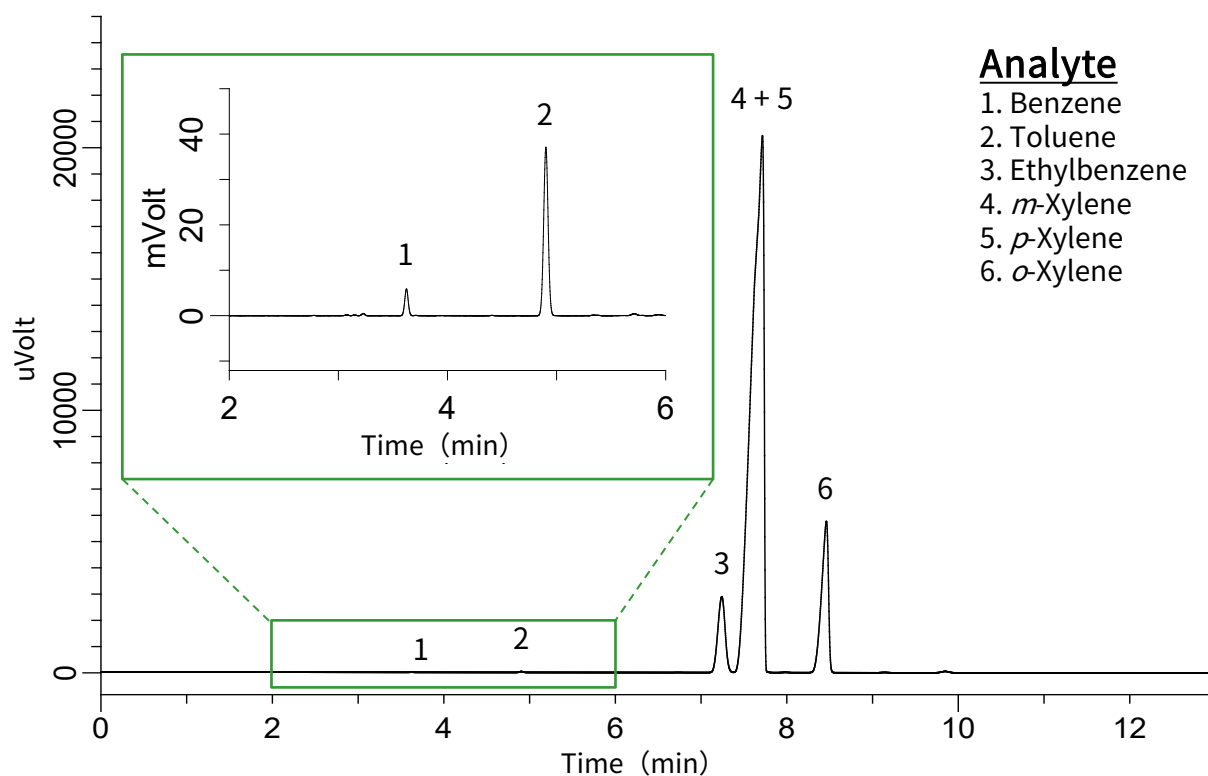
System	: GC - FID
Column	: InertCap 1 0.53 mm I.D. x 30 m df = 1.00 μm
Col. Cat. No.	: 1010-11445
Col. Temp.	: 80 °C (15 min) - 10 °C/min - 180 °C (5 min)
Carrier Gas	: He 3.00 mL/min
Injection	: Split 10:1 200 °C
Detection	: FID Auto Range 200 °C
Injection Vol.	: 0.2 μL
Syringe Size	: 10 μL

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	1.01
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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GL Sciences Inc. Japan

22-1 Nishishinjuku 6-chome
Shinjuku-ku, Tokyo
163-1130, Japan

Phone: +81-3-5323-6620
Fax: +81-3-5323-6621
Email: world@glsc.co.jp
Web: www.glsciences.com

GL Sciences Inc. USA

4733 Torrance Blvd. Suite 255
Torrance, CA 90503
USA

Phone: +1-310-265-4424
Fax: +1-310-265-4425
Email: info@glsciencesinc.com
Web: www.glsciencesinc.com

GL Sciences B.V.

Dillenburgstraat 7C
5652AM, Eindhoven
The Netherlands

Phone: +31-40-254-9531
Email: info@glsciences.eu
Web: www.glsciences.eu

GL Sciences (Shanghai) Limited

Tower B, Room 2003
Far East International Plaza
No.317 Xianxia Road, Changning District
Shanghai, China 200051

Phone: +86-21-62782272
Email: contact@glsciences.com.cn
Web: www.glsciences.com.cn



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