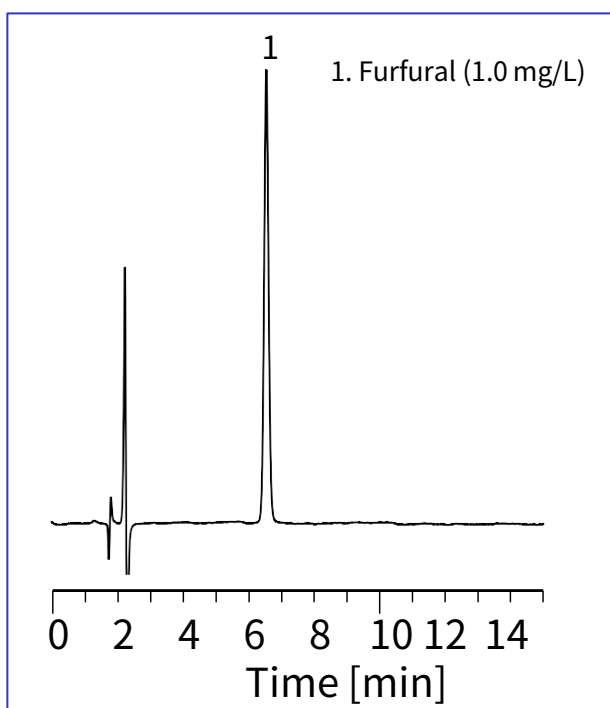


To check aged degradation of insulating oil, degradation product in insulating oil is often measured. Furfural is one of a degradation product of cellulose composing insulating paper in insulating oil. Furfural is stably dissolved in oil and distinction of degraded state of oil can be confirmed by measuring the concentration of furfural.

In this technical note, we introduce a HPLC method and two sample preparation methods (liquid-liquid extraction and solid phase extraction with silica gel column) for monitoring furfural in insulating oil.

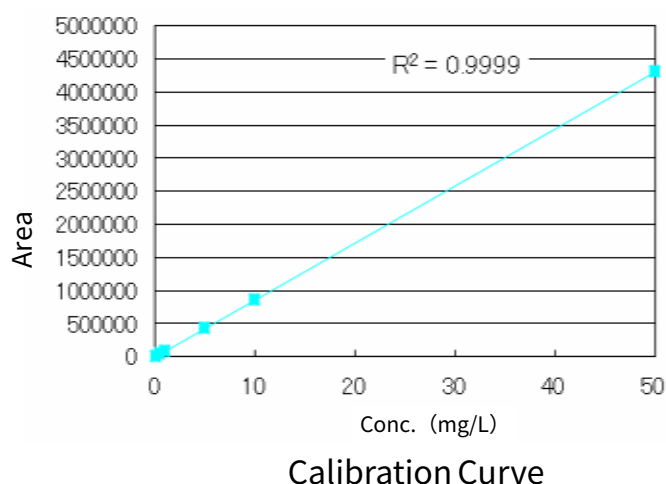
(K. Kanno)

Standard Solution



HPLC Conditions

System : LC800 UHPLC System
Column : InertSustain C18
 (5 μ m, 150 \times 4.6 mm I.D.)
Eluent : A) H₂O
 B) CH₃CN
 A/B = 90/10, v/v
 (Mixed by a gradient mixer)
Flow rate : 1.0 mL/min
Col. temp. : 40 $^{\circ}$ C
Detection : UV 278
 nm **Inj. vol.** : 10 μ L

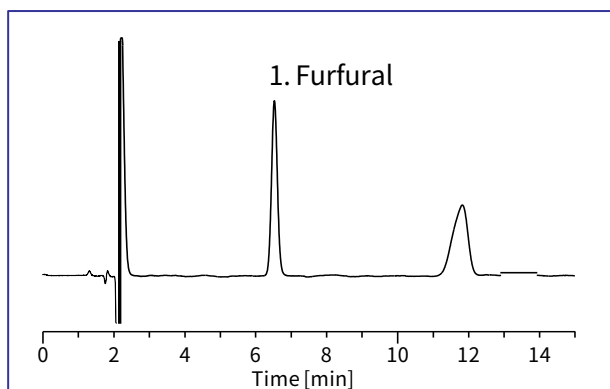


HPLC Column

InertSustain C18 5 μ m, 150 \times 4.6 mm I.D.
 Cat. No. 5020-07345

Sample Preparation Method Example ① (Solid phase extraction)

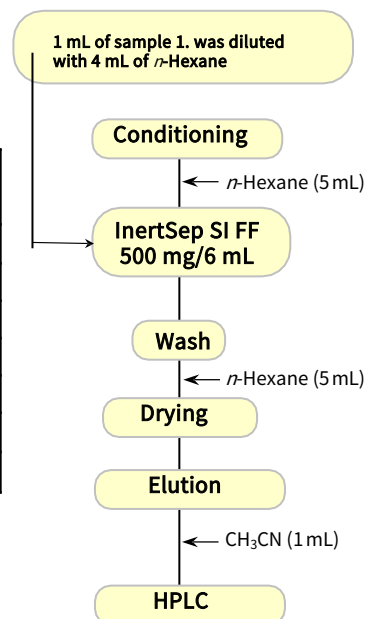
1. Furfural was added in fresh insulating oil as concentration of 1.0 mg/L.
2. SPE and HPLC were done five times.



<i>n</i>	Recovery rate [%]
1	97.3
2	95.2
3	96.4
4	95.9
5	96.7
Average	96.3
CV [%]	0.82

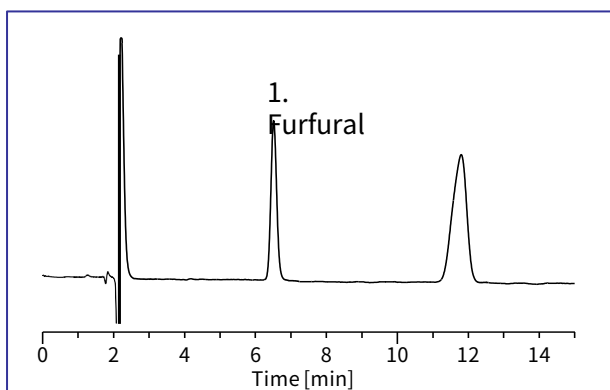
SPE Column

InertSep SI FF (Fast Flow) 500 mg/6 mL Cat. No. 5010-62344

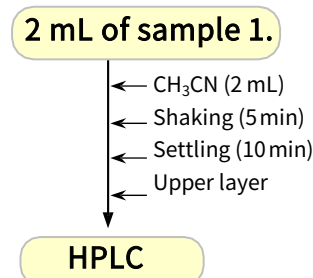


Sample Preparation Method Example ② (Liquid-liquid extraction)

1. Furfural was added in fresh insulating oil as concentration of 1.0 mg/L (same sample of example ①).
2. Liquid-liquid extraction and HPLC were done five times.



<i>n</i>	Recovery rate [%]
1	86.3
2	84.8
3	87.4
4	85.0
5	85.1
Average	85.7
CV [%]	1.29



GL Sciences disclaims any and all responsibility for any injury or damage which may be caused by this data directly or indirectly. We reserve the right to amend this information or data at any time and without any prior announcement.

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



International Distributors

Visit our Website at www.glsciences.com/distributors