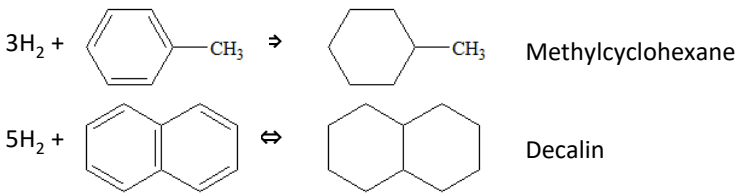
Analysis of Organic Hydrides (Hydrogen Carriers)

Hydrogen is expected to become an important source of clean energy that does not result in CO_2 emissions, and this is creating an urgent need to develop technologies to easily handle hydrogen in production, transport, storage, and use.

Hydrogen is a gas at normal temperatures and pressures. To liquefy, it must be cooled to less than -250 ˚C under high pressure, which is a major obstacle to mass transport and mass storage. At present, the development of materials as hydrogen carriers is being promoted; these can be used to efficiently transport and store hydrogen at low cost. Materials that can be used as hydrogen carriers include organic hydrides, ammonia, alcohols, and metals. Organic hydrides are compounds to which hydrogen is added to form aromatic compounds; these can be stored and extracted using catalysts - two examples are methylcyclohexane and decalin.

Examples) $3H_2 + N_2 \Leftrightarrow 2NH_3$



Structures created using Chemistry 4-D Draw provided
By ChemInnovayion Software, Inc.

In this application, two columns were used with non-polar liquid and neutral polar liquid phases, InertCap 1 and InertCap AQUATIC-2, respectively, representative components of organic hydrides were measured with good separation.

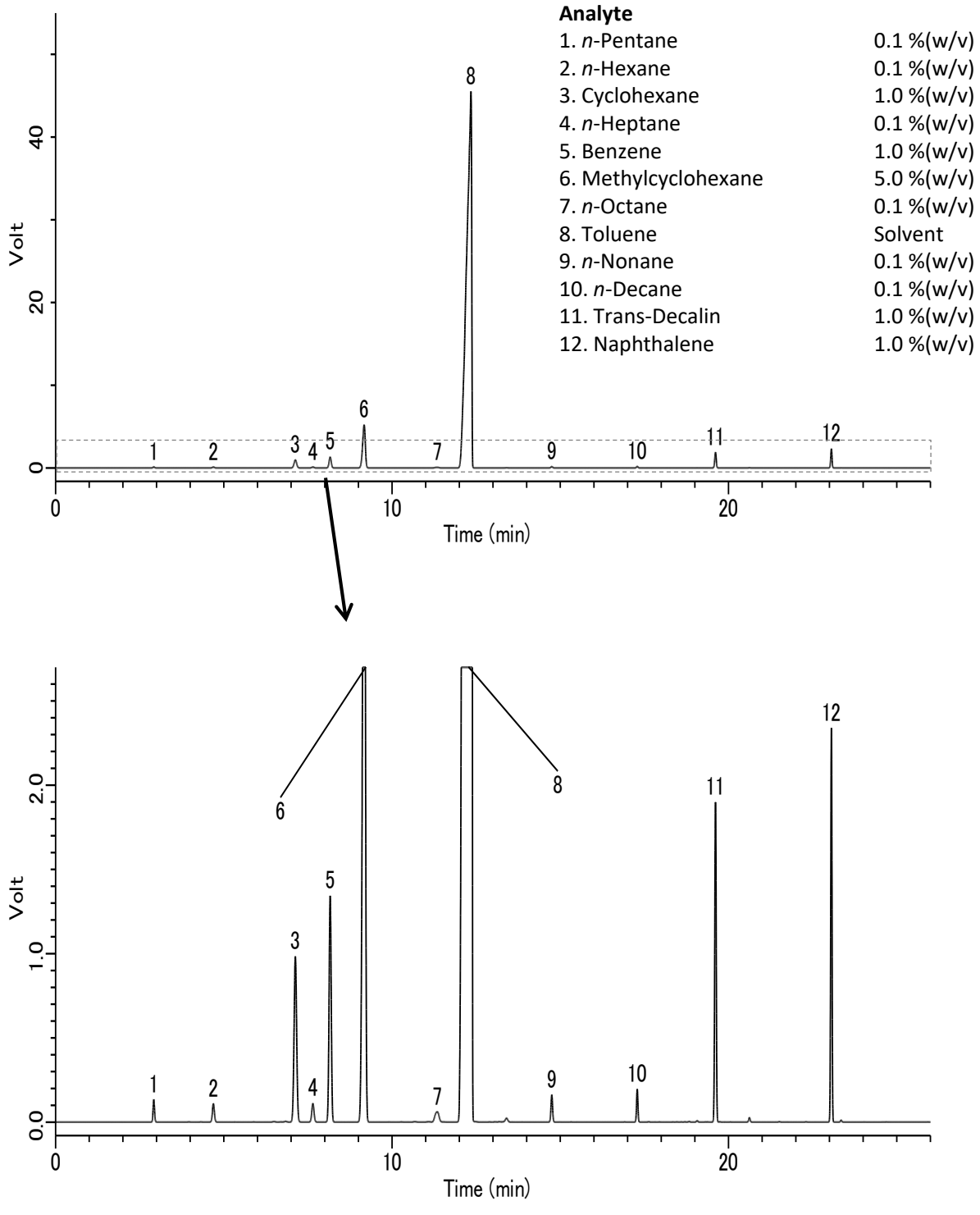
Conditions 1

System	: GC - FID
Column	: InertCap AQUATIC-2 0.32 mm I.D. x 30 m df = 1.8 µm
Col. Temp.	: 40 ˚C (3 min hold) - 5 ˚C/min - 90 ˚C - 10 ˚C/min – 220 ˚C
Carrier Gas	: He 1.7 mL/min
Injection	: Split flow 34 mL/min 230 ˚C
Detection	: FID Auto Range 250 ˚C
Sample Size	: 0.5 µL

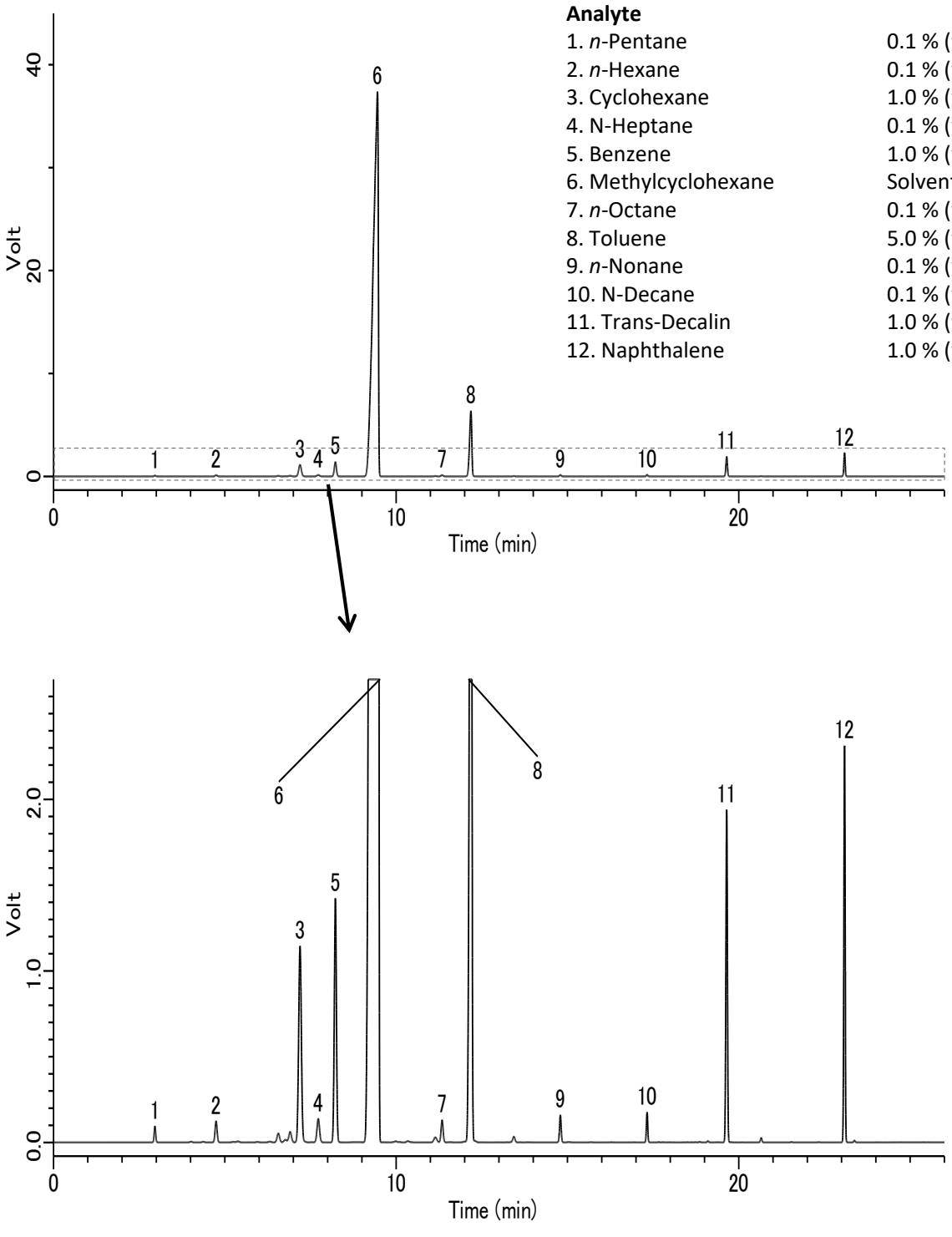
Conditions 2

System	: GC - FID
Column	: InertCap 1 0.32 mm I.D. x 30 m df = 1.0 µm
Col. Temp.	: 40 ˚C (2 min hold) - 5 ˚C/min - 75 ˚C - 10 ˚C/min - 180 ˚C
Carrier Gas	: He 1.7 mL/min
Injection	: Split flow 34 mL/min 230 ˚C
Detection	: FID Auto Range 250 ˚C
Sample Size	: 0.5 µL

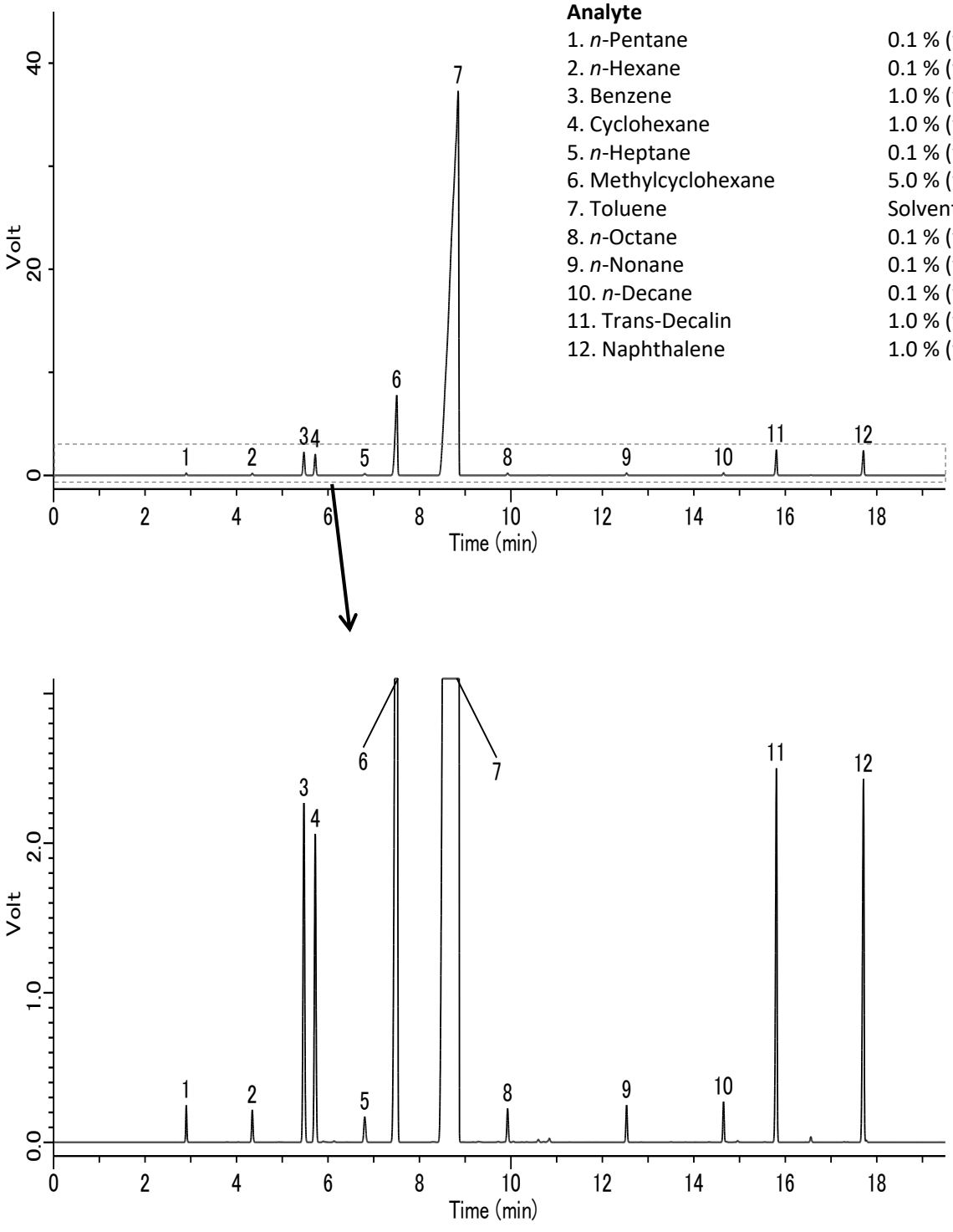
Examples: Analysis of Standard Samples (InertCap AQUATIC 2)



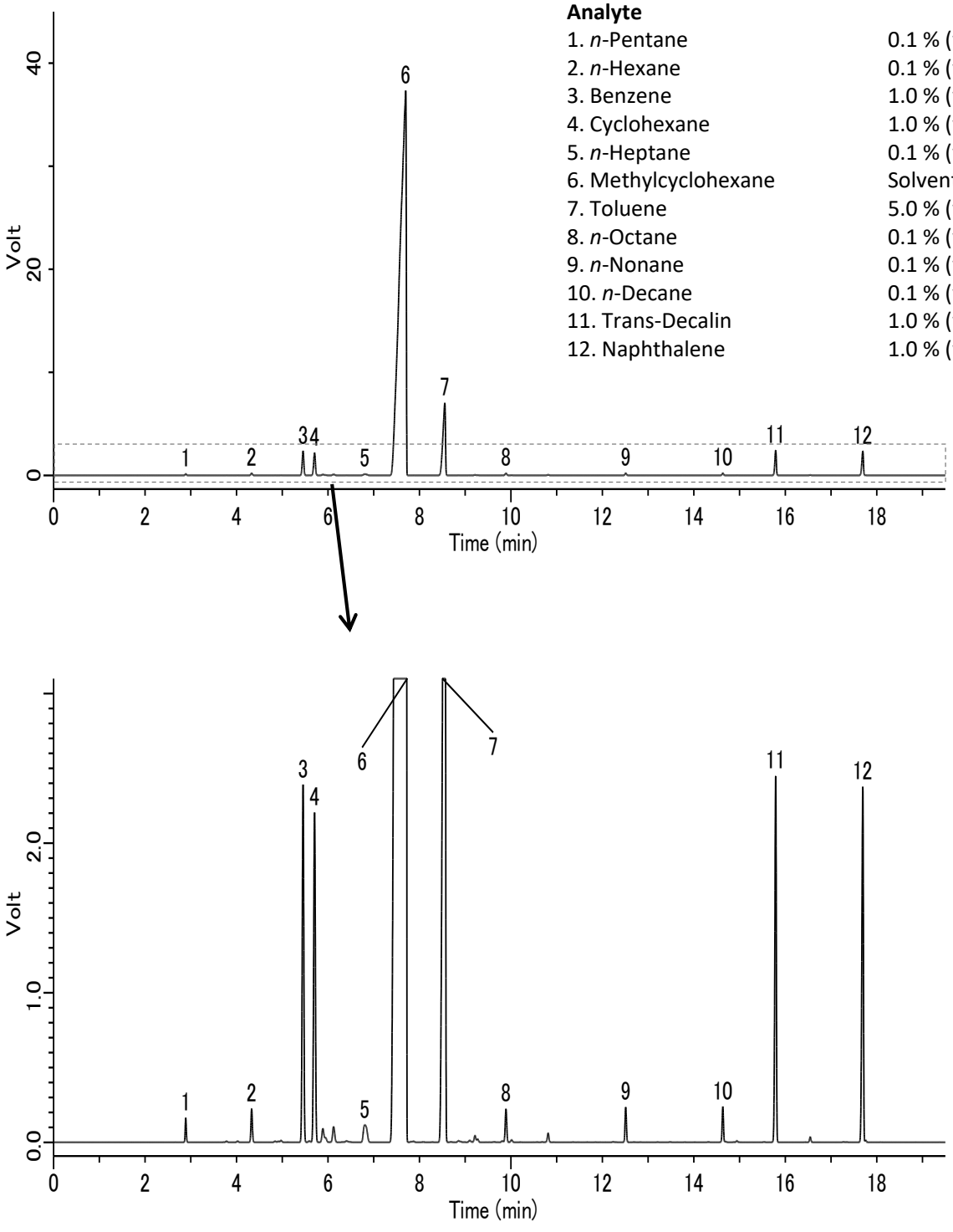
Examples: Analysis Standard Samples (InertCap AQUATIC-2)



Examples: Analyses of reference samples (InertCap 1)



Examples of analyses of reference samples (InertCap 1)



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@gls.co.jp
Web: www.glsciences.com

GL Sciences B.V.
De Sleutel 9
5652 AS Eindhoven
The Netherlands
Phone: +31 (0)40 254 95 31
Email: info@glsciences.eu
Web: www.glsciences.eu

GL Sciences, Inc. USA
4733 Torrance Blvd. Suite 255
Torrance, CA 90503
Phone: 310-265-4424
Fax: 310-265-4425
Email: info@glsciencesinc.com
Web: www.glsciencesinc.com

GL Sciences (ShangHai) Ltd.
Tower B, Room 2003,
Far East International Plaza,
NO,317 Xianxia Road,
Changning District.
Shanghai, China P.C. 200032
Phone: +86 (0)21-6278-2272
Email: contact@glsciences.com.cn
Web: www.glsciences.com.cn

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