Portable Real-Time Organic Compound Toxic Detector with chemosensor reagent

Presented by
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Sept 2018

Business Problems in Global Supply-Chain Industry

- Due to be over limit of **phthalate or plasticizer substances** can cause Carcinogenesis, Mutation or Reproductive (CMR) diseases, consumer products safety regulations in different countries set limitation of those organic compound strictly to be used in the consumer product and shall be tested before delivering to the market of import countries.
- Phthalate/Plasticizer shall be strictly not be over 0.1ppm to exist in food or food contact product and cosmetics; not over 1000ppm of various phthalates in toys, children and infant articles, etc., according to Product Safety Regulation of US CPSC and EU REACH Directive globally.
- **Due to be very expensive of total cost of building up in-house chemical laboratory need to spend for RMB 2 Million in which included GC-MS, nitrogen gas, laboratory hardware setting, etc. (Please see lower right-hand side photo)**
- **So that develop a cost-effective and real-time organic compound detector but its test result is highly similar to the test result of HPLC or GC-MS used in 3rd party laboratory.**

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Welcome to the next generation of the industry-proven Agilent 5975 Series MSD — the most popular GC/MS of all time. The Agilent 5975C inert MSD with its Triple-Axis Detector gives you innovative design features to boost your lab's productivity and advanced analytical capabilities that enhance your results—and your confidence. In addition to delivering better MS resolution and the lowest mass deviation available, the system offers superior sensitivity and spectral integrity. Advanced analysis routines let you get more information from every run, and the latest version of automated spectral deconvolution, identification, and quantification software provides higher quality analyses with even less operator time and attention. More.

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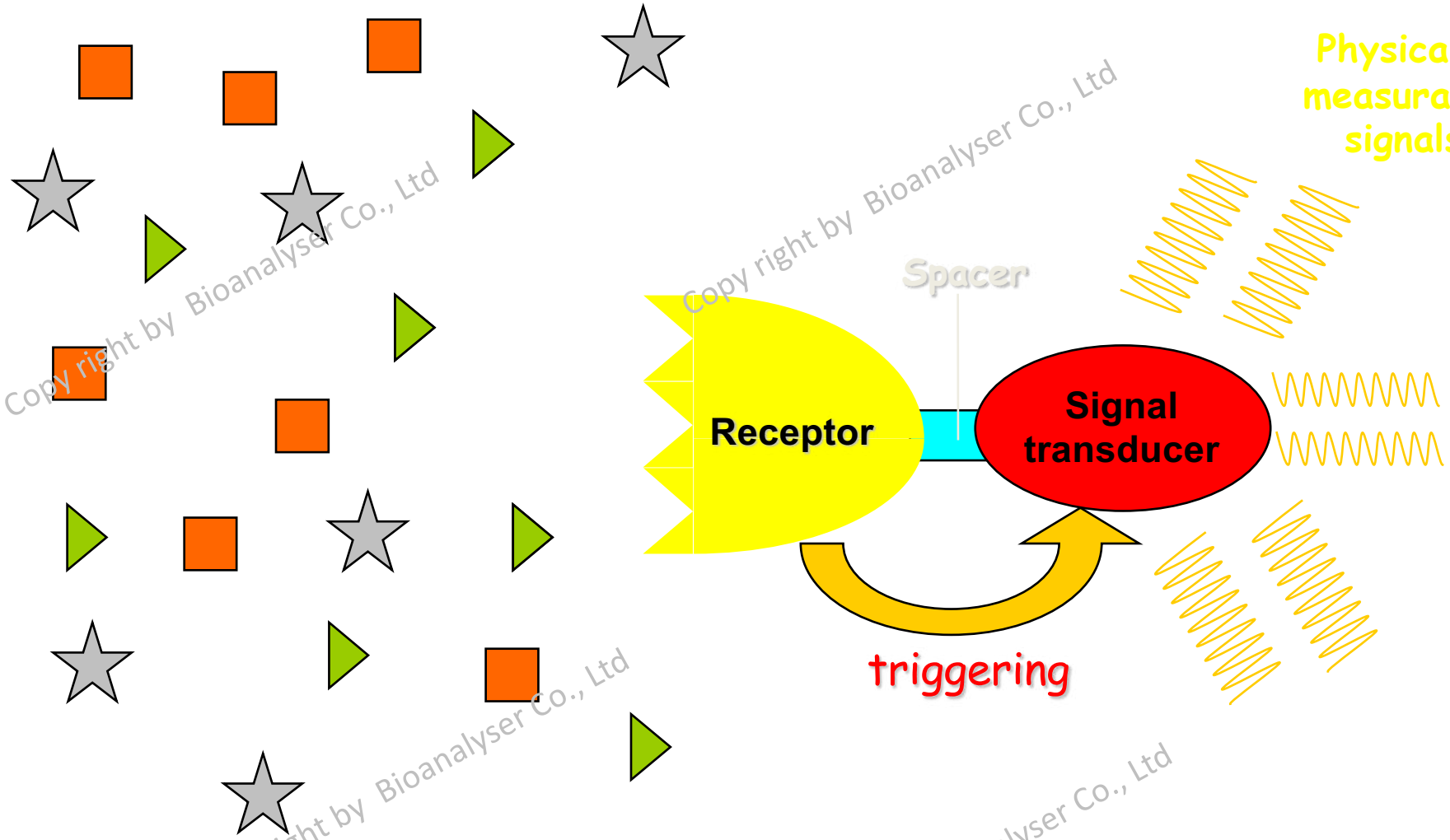


- Chemosensors of Molecular Imprinted Polymer are molecular devices able to selectively recognize and reversibly bind targeted molecular entities and yield measurable signals. However, plenty of limitations hinder the application of chemosensors in the real-world.

Advantages of Molecular Imprinted Technology

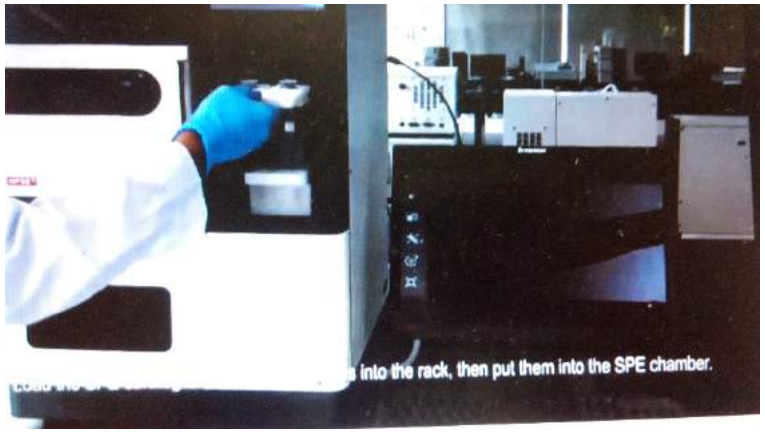
Advantages of Extraction for the novel MIP detection on phthalates or other organic substances:

1) Only need 10-15 minutes for extraction using ethanol solvent, if adopting general heater and pressurized vessel.
2) If adopting mini microwave for extraction, just need 15 minutes.
3) No harmful solvent for the operator, who has not chemistry training.
4) This novel extraction method can be conducted by onsite service

Advantages of this rapid MIP detection:

1) Only need to detect phthalates within 1-5 minutes for quantitative analysis
2) This real-time portable MIP chemosensor with optical instrument can be conducted by onsite detection
3) The test result can be transferred to cloud database service for retailer program or manufacturer supply-chain quality management program for your inspection team.

Conventional Automatic Extraction Method

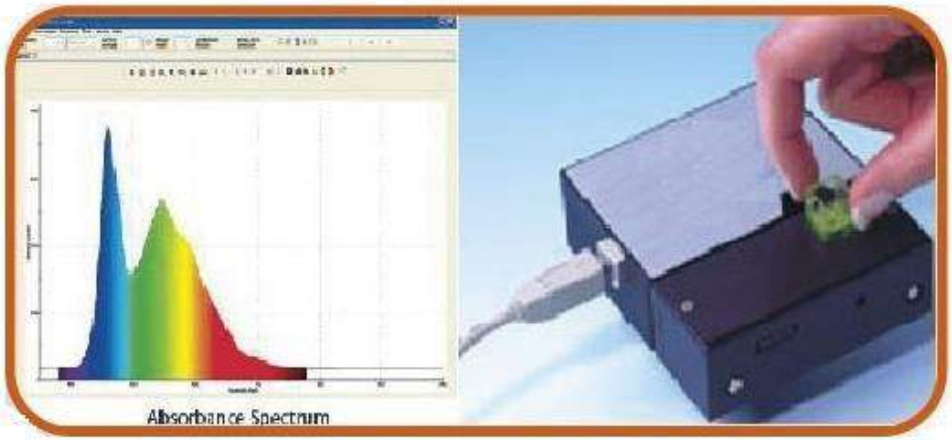


New Automatic Extraction Method Using Automatic Portable Extractor & H

- Extraction method using microwave technology for 15 minus;
- The effectiveness of recovery in extraction can achieve 85% or above

and its recovery extraction result is highly similar to the extraction processes shown in the standard test method of CPSC-CH-1001-09.3

The commercial product of the portable extractor look like the image shown as right-hand-side. This portable extractor has applied CE mark already.

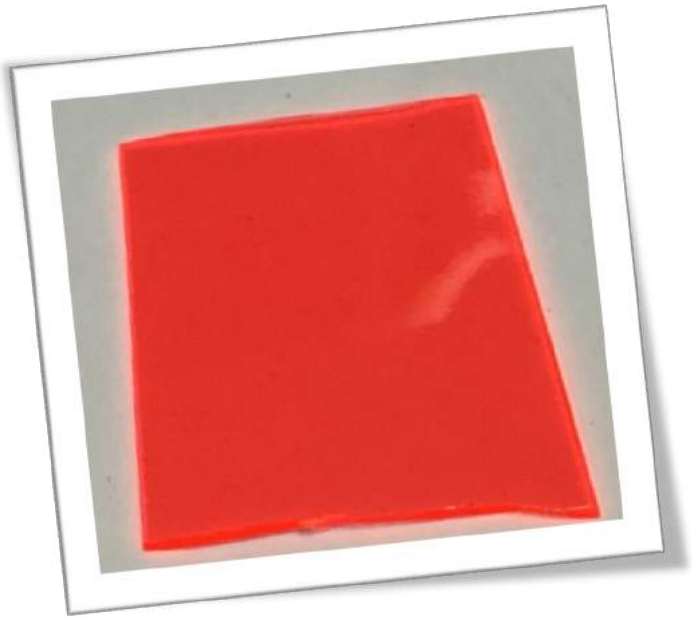


There are two handheld detectors shown as left hand side will be proposed:

- One is miniaturized spectrometer for the usage of conventional cuvette but its sensitivity is as same as a large size of spectrometer with patentable technology;
- An other one (shown as lower left-hand side) is a novel handheld detector with 4 x 4 or 6 x 6 microarray lab-on-a-chip for a customized combination of SVH or P AHs and other substances inside the matrix test chip for different customers' needs to conduct screening test.

Screening test for phthalates in plastic materials

1. To determine the content of phthalates in the PVC sample provided by SGS using a traditional GC-MS method (CPSC-CH-C1001-09.3) for blind test (Due Diligence);
2. To verify the recovery of phthalates when ethanol is used in the extraction processes other than conventional extraction method in CPSC-CH-C1001-09.3;
3. To compare the differences between GC-MS determination and our novel MIP chemosensor-based screening test method.



A PVC sample supplied by a local HOKLAS accredited testing laboratory with known phthalate content as a reference material

Comparison of Test Results between GC-MS determination and Molecular Imprinted Polymer

Determined via traditional established method CPSC-CH-C1001-09.3:

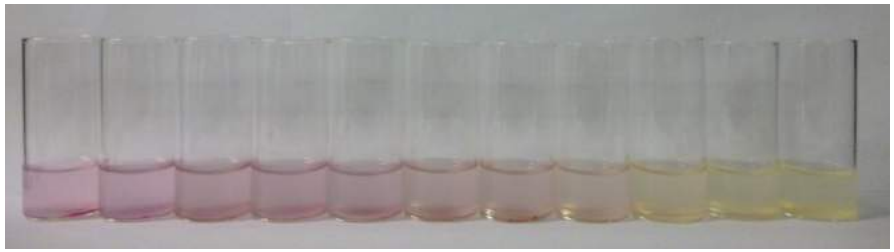
Extraction method is conventional heating in vessel with THF

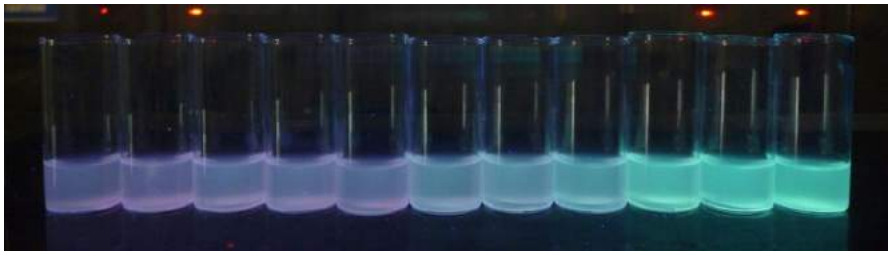
1. DEHP, %(w/w) : 0.67;
2. DINP, %(w/w) : 0.34;
3. DnOP, %(w/w) : 18.5.

Our extraction method with ethanol is microwave digestion for 15 minute

Determined via *in-house* ethanol extraction* adopted for chemosensing by Miolecular Imprinted Polymer (MIP):

1. DEHP, %(w/w) : 0.57;
2. DINP, %(w/w) : 0.30;
3. DnOP, %(w/w) : 17.1.



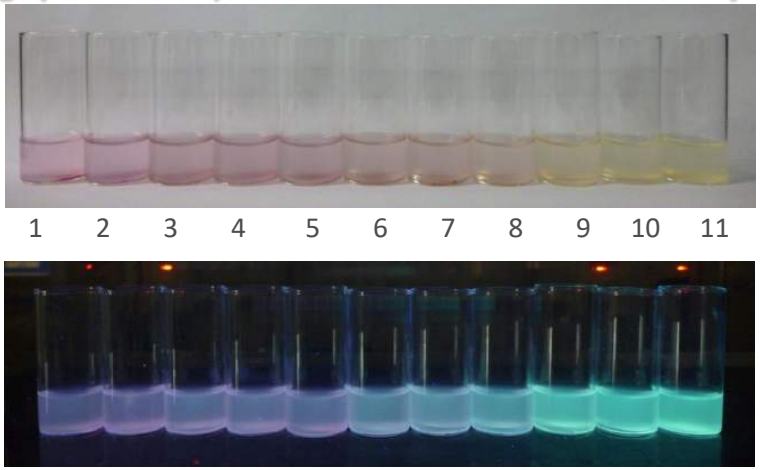


DEHP in ethanol concentration: (1) 0 μM; (2) 2 μM=0.7ppm; (3) 6 μM; (4) 10 μM; (5) 20 μM; (6) 60 μM; (7) 100 μM; (8) 200 μM; (9) 600 μM; (10) 1 mM; (11) 2 mM=800ppm .

Project Introduction

- This project will focus on developing a functional prototype of mobile detector and micro-extractor shown below figure
- Our chemical reagent can be produced by ourselves internally and then coat the reagent onto the glass chip for inserting it into the mobile detector for measurement.

The concentration of target analytes (e.g. phthalate) in term of different intensity of colour magnitude, which can be down to 1ppm (2uM)



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Technical Challenge

- Lack of support on applying US ASTM and European EN standard of a novel test method from ITC of HK Government for our invention;
- Lack of free-of-charge service of using chemical lab and instrument, because we need to conduct test with GC-MS or HPLC for comparing the test result with our invention for the evidence for the application of a new ISO test method standard;
- Lack of independently governmental finance support on our prototype production and promotion on the application rather than ESS 50%-50%; as an owner and inventor has not income and is facing investors who do not have investment attitude for supporting our invention for long-term business and profit. They do intently earn quick money by reselling the investment.
- Lack of financial support on the novel technological training introduced to Hong Kong from US, EU and Israel Universities by HK Innovative and Technological Bureau, ITC and HK Government

Target Marketing Segments

- SME factories (Upper stream of supply-chain) e.g. Toys factories, Cosmetics factories, etc.
- Global retailers (Down stream of supply-chain) e.g. Tesco, Carrefour, Walmart, etc.
- Global buying Office and trading companies of consumer products
- International commercial 3rd Party Laboratories and Government chemical laboratory
- Government sector e.g. Custom, consumer products safety section
- Universities, School, NGOs

Revenue of Testing, Inspection & Certificaties

Laboratory Business Sector / Revenue Item	SGS	Intertek (£)	BV (€)	UL (USD)
1. Hardware & Software Line Testing Service (Organic Test)	1,288M	+5.6%	1.5M	?
Total Revenue in Testing		2,786.3M	650.6M	?

Source: https://www.owler.com/company/ul
https://growjo.com/company/UL

Appendix A – Consumer Products Testing of SGS in 2021

Connectivity & Products

(CHF million)	2021	2020[2]	Change in %	2020 CCY[1]	Change in CCY[1] %
Revenue	**1 288**	1 175	9.6	1 184	8.8
Adjusted operating income*	**316**	287	10.1	290	9.0
Margin %*	**24.5**	24.4		24.5	

Acquisitions

- Brightsight in The Netherlands

Connectivity & Products revenue increased by 8.8% at constant currency (organic growth was 7.7%) to CHF 1 288 million. Excluding the impact from lower PPE testing volumes, there was a strong recovery in all Strategic Business Units (SBU).

Connectivity grew materially more than the divisional average with an excellent contribution from all segments which was supported by easing regional restrictions, our long-term focused investment strategy and further penetration into the Cybersecurity market through the acquisition of Brightsight.

Softlines growth was below the divisional average. A strong recovery in Bangladesh, Taiwan and Turkey was driven by increased levels of activity from major retailers and brands. There was also good progress from our sustainable solutions. As expected, PPE testing volumes were at a lower level compared to last year.

Hardlines increased less than divisional average. Hardgoods recovered strongly in all geographies and improving European and Asian market conditions resulted in higher automotive laboratory testing volumes. Toys and Juvenile was stable compared to last year.

Trade Facilitation services posted higher growth than the divisional average led by eCustoms services expansion in Europe. This was partially offset by unfavorable trade conditions affecting certain Product Conformity Assessment programs.

The **adjusted operating income margin** remained stable at 24.5% versus prior year (at constant currency), with profitability improving across most of the portfolio due to a strong focus on cost and structural optimization. This was offset by lower volumes of highly profitable PPE testing.

Source: https://www.sgsgroup.in/-/media/global/documents/financial-documents/financial-reports/2021/sgs-2021-full-year-results-report.pdf?la=en-gb

Appendix B – Consumer Products Testing of Intertek in 2021

2021 FULL YEAR RESULTS ANNOUNCEMENT

1 March 2022

Strong Progress in Revenue, Margin, Earnings and Cash

- Revenue of £2,786.3m: +6.5% at constant rates and +1.6% at actual rates
- Robust LfL revenue growth of 5.6% at constant rates: Products: +7.6%, Trade: +3.0%, Resources +1.7%
- Broad-based LfL revenue growth and record operating profit and margin in H2
- Double-digit adjusted operating profit growth of +15.4% at constant rates and +10.8% at actual rates
- Strong adjusted operating margin of 17.0%: +130bps at constant rates and +140bps at actual rates
- Double-digit adjusted diluted EPS growth of +16.8% at constant rates and +11.6% at actual rates
- Strong cash conversion delivers free cash flow of £402m; financial net debt of £733m, 1.1x adjusted EBITDA
- 18.2% ROIC with organic ROIC of 24.4% up 350bps at constant rates
- Sustainable returns to shareholders with FY21 dividend of 105.8p in line with 2019 and 2020
- Well positioned to seize the exciting growth opportunities ahead with industry leading ATIC services
- 2022 outlook: Robust LfL revenue growth at constant rates, margin progression and strong free cash flow

A FY results video is available on our website http://www.intertek.com/investors/2021-full-year-results-video

Source: https://www.macrotrends.net/stocks/charts/IKTSY/intertek-gp/gross-profit
https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwihvO7gq7_4AhVMC94KHRrnA-gQFnoECAYQAw&url=https%3A%2F%2Fwww.intertek.com%2Fnews%2F2022%2F2021-full-year-results-announcement%2F%23%3A~%3Atext%3DGroup%2520revenue%2520was%2520%25C2%25A32%252C786%2Cwith%2520margins%2520increasing%2520to%252017%2525.&usg=AOvVaw0RWIXW_gbMnTJsK6YtqNHp

Appendix C – Consumer Products Testing of BV in 2021

	ANNUALIZED REVENUE	COUNTRY	DATE	FIELD OF EXPERTISE
Buildings & Infrastructure				
PreScience	c. EUR 21m	United States	Dec. 2021	Project management / Construction management services for Transportation Infrastructure projects
Cybersecurity				
Secura B.V.	c.EUR 10m	Netherlands	Jan. 2021	Security testing, audit, training and certification services covering people, organization, and technology (networks, systems, applications and data)
Consumer Products				
Zhejiang Jianchuang Testing Technology Services Company Limited	c.EUR 1.5m	China	Feb. 2021[3]	Softlines testing focusing on domestic brands and e-shops in China
AET France	EUR 2m	France	Sep. 2021[4]	Laboratory testing, product development and sustainability testing
Renewable energy				
Bradley Construction Management	EUR 11m	United States	Mar. 2021	Construction management services for the renewable energy sector
Sustainability Certification				
HDAA Australia	c.EUR 3m	Australia	Apr. 2021	Auditing and assessments focused on the health and human services sector

The pipeline of opportunities is healthy, and the Group will continue to deploy a selective bolt-on acquisitions strategy, in targeted strategic areas (notably Buildings & Infrastructure, Renewable Energy, Consumer Products, Technologies and Cybersecurity).

Source: https://group.bureauveritas.com/sites/g/files/zypfnx196/files/media/document/20220224_PR_Full-Year-2021_results.pdf

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专利申请日：2017 年 01 月 27 日

专 利 权 人：梁庆耀

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授权公告日：2022 年 06 月 03 日　　授权公告号：CN 109073561 B

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