

Screening System for Phthalate Esters and Brominated Flame Retardants

Py-Screener Ver. 2



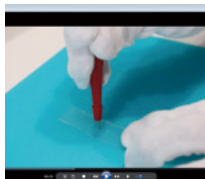
Making the Difficult Simple

Py-Screener™ Ver. 2 is designed to screen for brominated flame retardants, such as PBBs and PBDEs, and phthalate esters in polymers. These substances are regulated under the Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS (II) Directive) in Europe. The pyrolyzer GC/MS (Py-GC/MS) is used to selectively detect and quantify these restricted substances thermally extracted from samples. This screening system consists of a sampling toolkit, special standards, and special software and can be easily operated even by novices.

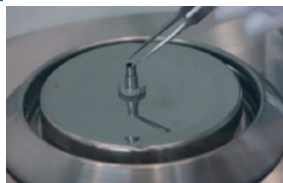
Easy to Operate Even for Novices

Organic Solvents Are Not Required for Sample Preparation

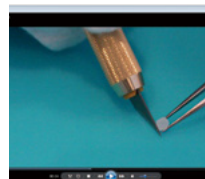
Analytical standards and test samples can be prepared without using organic solvents. To prepare a sample, just use the cutter to remove a portion from the test material, place it in the sample cup, and weigh it. Sample preparation videos provide support so that even novices can easily prepare samples.



Preparation of a Phthalate Ester Standard



Weighing Using an Electronic Balance



Preparation of a Test Sample



Analytical Balances AP Series



Shimadzu balances product lineup

All Required Items Are Available

Special Standards for Phthalate Esters Toolkit Required for Sample Preparation

The standards of phthalate esters for sensitivity confirmation, quantitation, and blank tests can be prepared simply by punching out a portion of a standard material using the micro puncher. A toolkit used for preparing samples has been created with Frontier Laboratories Ltd.



Standards Containing Phthalate Esters for Py-GC/MS

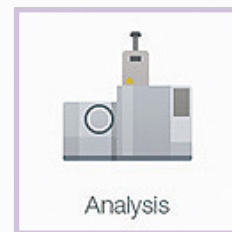


Sampling Toolkit

SHIMADZU Py-Screener



Sample Preparation



Analysis

Easy to Operate Using Special Software

Using customized software, operations are easy, even for novices. To automatically start continuous analyses, just place the prepared standards and test samples in the autosampler, and enter the number of samples, the sample names, and their weights. Phthalate ester inspections compliant with the IEC62321-8 international analysis standard, the industry standard for RoHS inspections, can be performed easily by anyone. Shimadzu offers both a simultaneous inspection method (normal method and high-speed method) for phthalate esters and brominated flame retardants, and a special high-speed inspection method for phthalate esters, to meet a wide range of customer requirements.



Weighing



Enter sample information



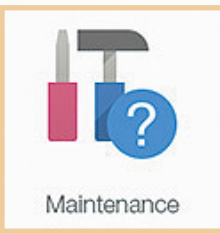
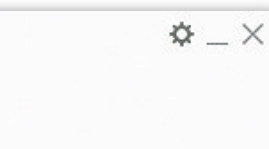
Start inspection

	Vial#	Sample Name	Sample Amt.
1	1	Blank_Cup	0.5
2	2	Phthalate_STD_Blank	0.51
3	3	Phthalate_STD_100	0.51
4	4	Phthalate_STD_1000	0.51
5	5	ECM-EO591	0.51
6	6	Test Sample	0.51
7	7	Test Sample	0.51
8	8	Test Sample	0.51

Easy to Operate Even for Novices

Tabular Display of Concentrations and Criteria Clarifies the Results

The concentrations of target components detected in continuous measurements are displayed in a table and color-coded using criteria based on concentration ranges. The results for continuously measured test samples can be checked at a glance. Also, the system is equipped with accuracy control functions in order to ensure the reliability of blank concentrations, instrument sensitivity, and other data, so even novices can feel confident that they are reporting reliable measurement results.



Py-Screener Software

The special software displayed on the monitor helps you navigate the required procedures. Even novices can operate the system using the software.

Ample Maintenance Support

Maintenance Navigation Supports Long-Term Operation with Periodic Replacement Kits

Using the Maintenance Navigator, the procedures appropriate for pyrolyzer and GC-MS maintenance can be performed easily and confidently. If a leak occurs, you can easily identify the cause by following the navigation menu. In addition, the regular replacement parts kit, which is made up of parts that become contaminated during long-term operation, enables safe operation, even over a long period of time.



Remove the TTF cover of the pyrolyzer furnace. Be cautious of the needle while performing this work.

Remove the heat sink selector by loosening securing screws in two places using 1.5 mm hexagon screwdriver.
[CAUTION] Be careful so as not to get burned, since the stainless steel heat insulation cylinder can be hot even though the displayed temperature of the instrument is low.

- ✓ Detailed maintenance steps with photos attached (Photos can be enlarged)
- ✓ A list of solutions for troubleshooting is included
- ✓ A list of consumables is included

Maintenance Navigator Windows

More Effective and Efficient Inspections with Four New Functions

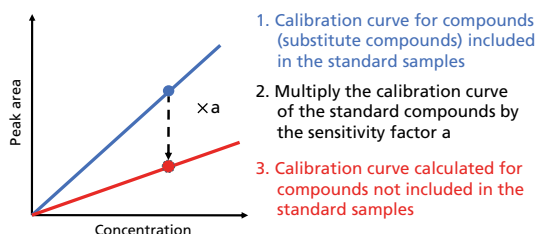
Py-Screener Ver. 2 retains the convenience of the previous Py-Screener, but is equipped with four new functions that enable even more effective and efficient inspections.

1. Simultaneous Inspections for Phthalate Esters and Brominated Flame Retardants (Total of 20 PBBs and PBDEs)

The system can perform batch inspections for phthalate esters and a total of twenty PBBs and PBDEs with between one and ten bromine atoms. With the new "correction factor database" function, the software automatically generates calibration curves for the compounds not included in the standard sample based on the calibration curve information of the standard sample, allowing the concentration of all of the above compounds to be calculated. A simultaneous screening method for phthalate esters, PBBs and PBDEs using Py-GC/MS has been studied for standardization under the international analytical standard IEC 62321 3-3.

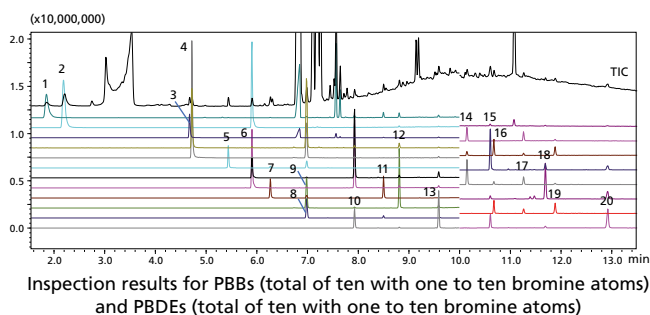
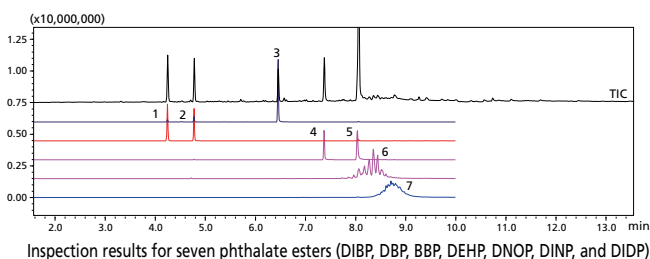
Note: The same standard sample used in Ver. 1 is used in Ver. 2. However, calibration curve information obtained with conventional products cannot be used with Ver. 2.

Expanding the number of target compounds using the new correction factor database function



Equipped with the correction factor database function, which registers the area ratio information of the compounds (substitute compounds) included in the standard samples and the compounds not included in the standard samples.

A wide range of compounds can be quantified just with standards samples for some compounds.

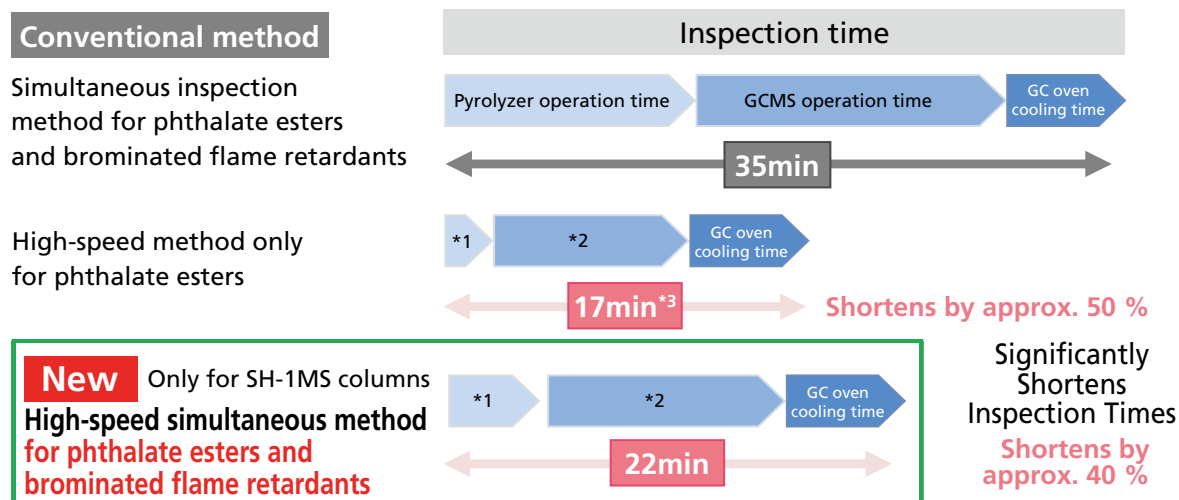


2. Newly Developed High-Speed (22 Minute) Simultaneous Inspection Method for 7 Phthalate Esters and Brominated Flame Retardants

A method has been developed that significantly shortens simultaneous inspection times for phthalate esters and brominated flame retardants. This enables productive and reliable inspections for a wide range of regulated compounds.

Note 1: This edition also includes the conventional (35 minute) simultaneous inspection method for phthalate esters and brominated flame retardants, and an inspection method compatible with high-speed screening exclusively for phthalate esters.

Note 2: This simultaneous inspection method is only compatible with Shimadzu high-durability columns (SH-1MS with guard column).



*1 Pyrolyzer operation time *2 GCMS operation time *3 For UA-PBDE column. 19 min for SH-1MS column.

3. Phthalate Ester Screenings in Accordance with the European REACH Regulation

Since 2020, under the European REACH regulation, the same four phthalate esters (DIBP, DBP, BBP, and DEHP) regulated under the RoHS directive have become regulated in a wide range of molded items including toys and childcare articles. Under the REACH regulation, regulatory concentration values are established with respect to individual concentration values and total calculated concentration values, which means that this regulation must be managed differently than the RoHS directive. This system is capable of automatic screening determinations with respect to the total calculated concentration of these four phthalate esters. It can also be used for phthalate ester inspections aimed at the REACH regulation.

Summary Results			
#	Name	<input checked="" type="checkbox"/> Sample R2	
<input checked="" type="checkbox"/>			Conc.
<input checked="" type="checkbox"/> 1	DIBP		141.83
<input checked="" type="checkbox"/> 2	DBP		372.04
<input checked="" type="checkbox"/> 3	BBP		302.52
<input checked="" type="checkbox"/> 4	DEHP		447.40
<input checked="" type="checkbox"/> 5	DNMP		----
⋮			
<input checked="" type="checkbox"/> 30	Total PBDEs		0.00
<input checked="" type="checkbox"/> 31	Total PBBs		0.00
<input checked="" type="checkbox"/> 32	DIBP, DBP, BBP, DEHP		1263.80

Individual concentrations of DIBP, DBP, BBP, and DEHP

Screening for RoHS

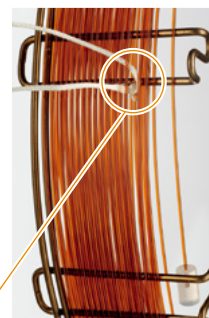
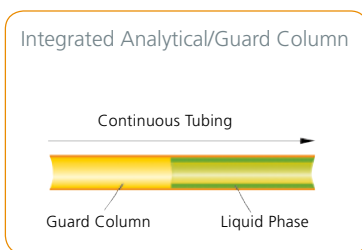
Total concentration of DIBP, DBP, BBP, and DEHP

Screening for REACH

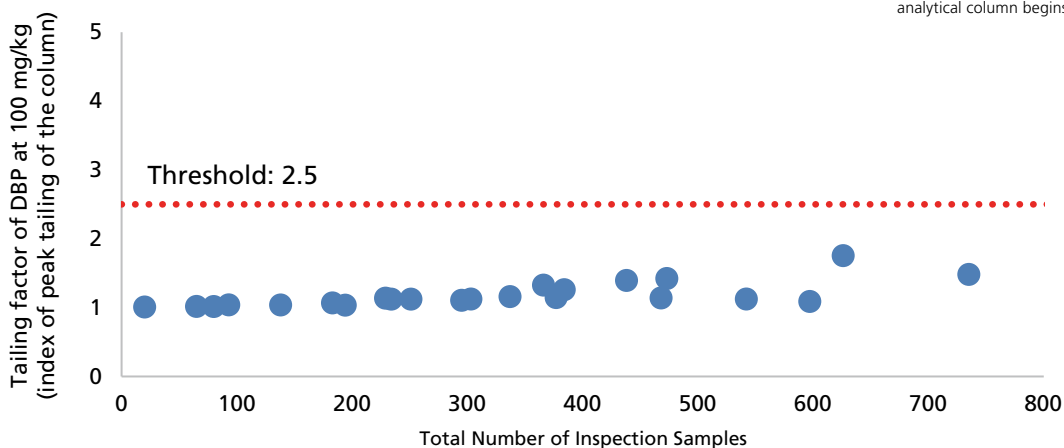
4. High Durability Columns Dedicated for Py-Screener Ver. 2

The system is now compatible with inspections with Shimadzu's SH-1MS high-durability column, which includes a guard column as part of its design. This reduces the maintenance burden and running costs by limiting column deterioration, even for customers who screen frequently.

The guard column is integrated, so there are no concerns about leaks due to the guard column connection or adsorption and decomposition of compounds targeted for screening at the connection site.



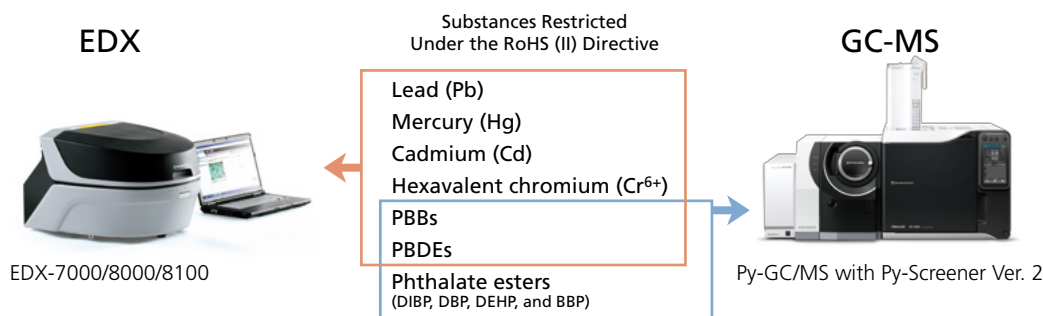
String indicates where the analytical column begins



Results of a durability test using the high-durability column (SH-1MS with integrated guard column) dedicated for Py-Screener Ver. 2

A Total Solution Proposed by Shimadzu for the RoHS (II) Directive

In addition to the Py-Screener Ver. 2 system, Shimadzu provides an Energy Dispersive X-ray (EDX) fluorescence spectrometer for inorganic compound screening and various other analytical systems for accurate quantitation. These systems provide a total solution for everything from screening to the accurate quantitation of substances regulated under the RoHS (II) Directive. It is possible to create a report by integrating the inspection data obtained by EDX and GCMS, and since Shimadzu offers RoHS-compatible instruments, a comprehensive management system can be constructed.



EDX + GCMS Summary Report		
EDX		
Date	2018/7/6	
Sample Name	PVC Ring	
Comment	Material Check 10mm	
	Result	Judgement
Cd	ND	OK
Cr	ND	OK
Hg	ND	OK
Pb	2910.8	NG
Br	ND	OK
GCMS		
Date	2018/7/19 22:09	
Sample Name	PVC	
Comment		
	Result	Judgement
DIBP	1.14449	OK
DBP	2.99665	OK
BBP	0.136591	OK
DEHP	9.20041	OK
DNOP	0.16339	OK
DINP		
DIDP		
Total Judgement		
Judgement	NG	
Comment		

Reports can be created by integrating the inspection data obtained by EDX and GCMS.

A comprehensive management system can be constructed by using Shimadzu's RoHS-compatible instruments.

Applicable Systems and Software

GC-MS	: GCMS-QP2020 NX, GCMS-QP2020, GCMS-QP2010 Ultra
Pyrolyzer	: EGA/PY-3030D multi-shot pyrolyzer
Autosampler	: AS-1020E auto-shot sampler
GC/MS Workstation	: GCMSsolution™ (Ver.4.53 or later) + LabSolutions Insight™ (Ver. 3.8 SP1 or later)
Py Workstation	: EGA-PY3030 program (Ver. 1.54 or later)

Caution

- Note that there are no guarantees regarding the accuracy of the information contained in the method files, or the usefulness of the information obtained from the results of their use.
- In order to accurately identify the registered substances, perform the measurements using the system conditions in the method files contained in the product.

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