

# Roediger Agencies cc

REG No: 93/29837/23  
VAT No: 4200155465

Polymer Science Building  
De Beer Street, STELLENBOSCH 7600  
www.roedigeragencies.co.za

## ANALYTICAL LABORATORY

PO Box 3202  
MATIELAND 7602

Tel: +27 21 887 0010  
Fax: +27 21 886 4731  
Cell: 083 250 9281

5 October 2016

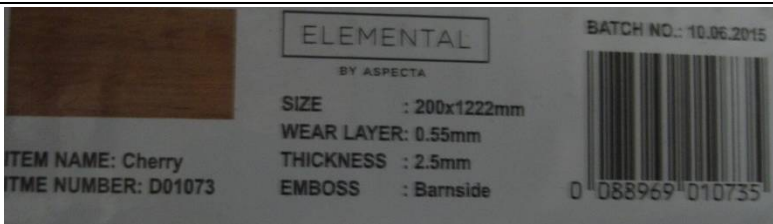
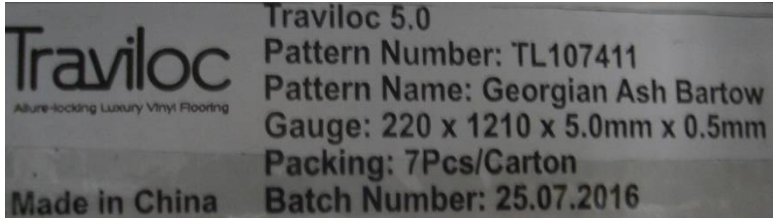
Paul Bracher  
Traviata Flooring Systems  
Unit 5  
Route 24  
Herman Street, Meadowvale  
GAUTENG

Dear Mr. Bracher

### REF no.: 3009TFS1/1-2

Two vinyl flooring samples in sealed boxes were sent to the analytical laboratory of Roediger Agencies cc for analysis via the following test methods to determine heavy metal content as well as the phthalate content.

The sealed boxes were opened and the samples were:

1	ELC001 Elemental Cherry 2.93 m <sup>2</sup> pb by Aspecta	
2	TR5005 Traviloc 5.0 Droplock Georgian ash Bartow 107411	

### Ash content

The ash content was determined by ashing each sample in a muffle oven up to 550 °C and holding it at that temperature for an hour, then weighing each sample and the percentage residue is calculated by mass difference from the original mass.

Sample	Ash content (%)
ELC001 Elemental Cherry 2.93 m <sup>2</sup> pb by Aspecta	53.95
TR5005 Traviloc 5.0 Droplock Georgian ash Bartow 107411	66.12

The ash was sent for elemental analysis.

## EDAX

EDAX is the employment of x-rays to analyse the elements present on a surface of a sample. Only the higher atomic numbers can be detected, the cut off limit is oxygen, thus the relative abundance of an element will result in a higher output signal from the excitation of the x-rays.

Sample		Elemental weight (%)					
		C	O	Mg	S	Cl	Ca
ELC001 Elemental Cherry 2.93 m <sup>2</sup> pb by Aspecta	1		46.89	0.84		11.10	41.17
	2		46.59	4.95		18.79	29.67
	3		49.45	3.33		8.91	38.31
	<b>Average</b>		<b>47.65</b>	<b>3.04</b>		<b>12.93</b>	<b>36.38</b>
	<b>ppm</b>		<b>257072</b>	<b>16401</b>		<b>69757</b>	<b>196270</b>
TR5005 Traviloc 5.0 Droplock Georgian ash Bartow 107411	1	10.33	43.70	4.52	0.00	6.17	35.28
	2	9.81	51.35	2.54	0.75	5.37	30.18
	3	16.96	46.65	3.65	1.09	3.45	28.20
	<b>Average</b>	<b>12.36</b>	<b>47.23</b>	<b>3.57</b>	<b>0.61</b>	<b>5.00</b>	<b>31.22</b>
	<b>ppm</b>	<b>81724</b>	<b>312285</b>	<b>23605</b>	<b>4033</b>	<b>33060</b>	<b>206427</b>

## Soxhlet Extraction

The samples were extracted with diethyl ether in a soxhlet for 4 hours. The solvent was evaporated after the extraction and the amount of extractant quantified prior to analysing by infrared as described below.

Sample	Extract (%)
ELC001 Elemental Cherry 2.93 m <sup>2</sup> pb by Aspecta	9.81
TR5005 Traviloc 5.0 Droplock Georgian ash Bartow 107411	7.25

FTIR and GC-MS analysis were conducted on the extract.

## FTIR photoacoustic infrared

Fourier Transform Infrared (FTIR) is a common tool to analyse the chemical composition of a product and is typically employed to monitor the presence of the chemical functional groups on a molecule. To obtain an infrared a sample has to be prepared in a translucent film or be physical mixed with a salt that when pressed will give a translucent window through which an infrared beam can be passed and the absorbance of this beam is measured. A recent development in infrared is to make use of a photoacoustic cell (PAS), which has the advantage that sample preparation is eliminated and that a sample can be scanned in whatever form it appears. The sample is placed in an MTEC 300 chamber and flushed with ultra high purity helium. The resultant infrared spectrum is recorded on a Perkin Elmer Paragon 1000 FTIR.

The FTIR picks up absorbencies for each functional group. A single functional group yields more than one absorbance band due to the stretching, rocking and vibrational bond movements. Some absorbencies may overlap and hence it is sometimes difficult to clearly define an absorbance peak to only one bond. Peak areas are relative to the amount of a functional group present if the analysis is carried out under the same conditions each time. In the case of PAS FTIR this is the quantity of gas above the sample, the temperature of the sample and the amount of scans. A further unique feature of PAS FTIR is that the depth of analysis

can be varied by varying the mirror speed of the infrared. The slower the mirror speed the deeper the penetration of the analysis.

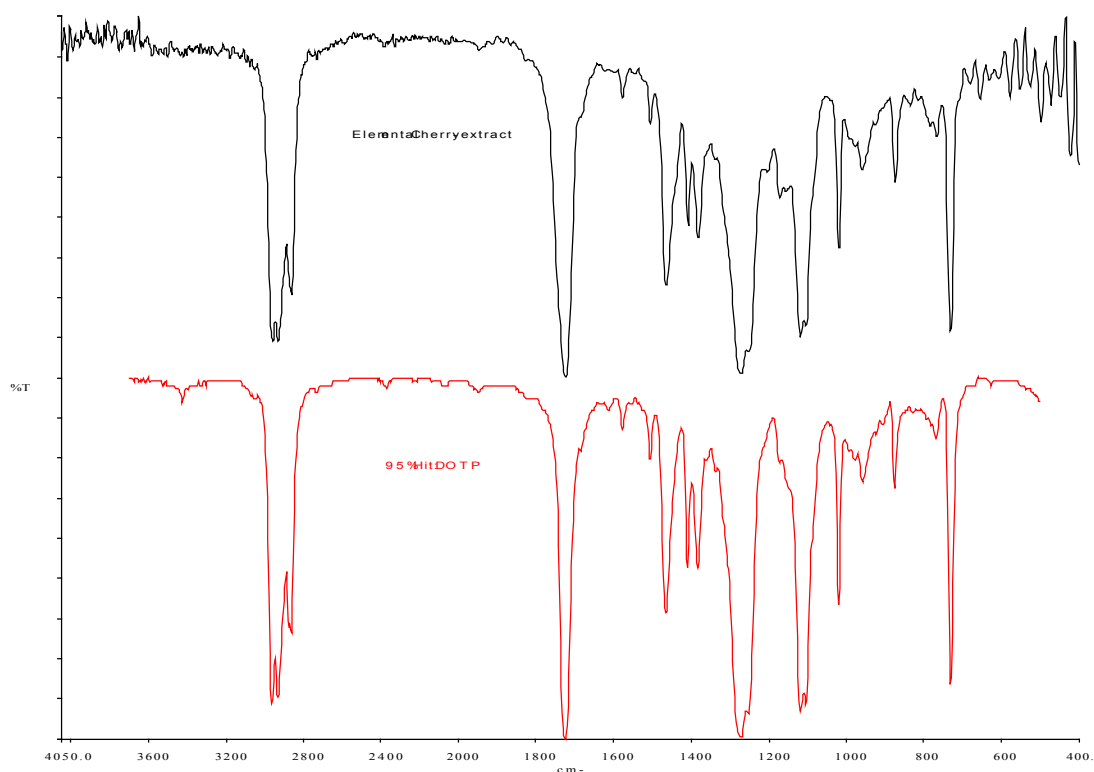
### Procedure

The sample was analyzed by means of photo acoustic Fourier Transform Infrared spectroscopy (FTIR). The photoacoustic detector used was a MTEC model 300 unit that was coupled to a Perkin Elmer Paragon 1000. The parameters used for the determination of each spectrum were the following:

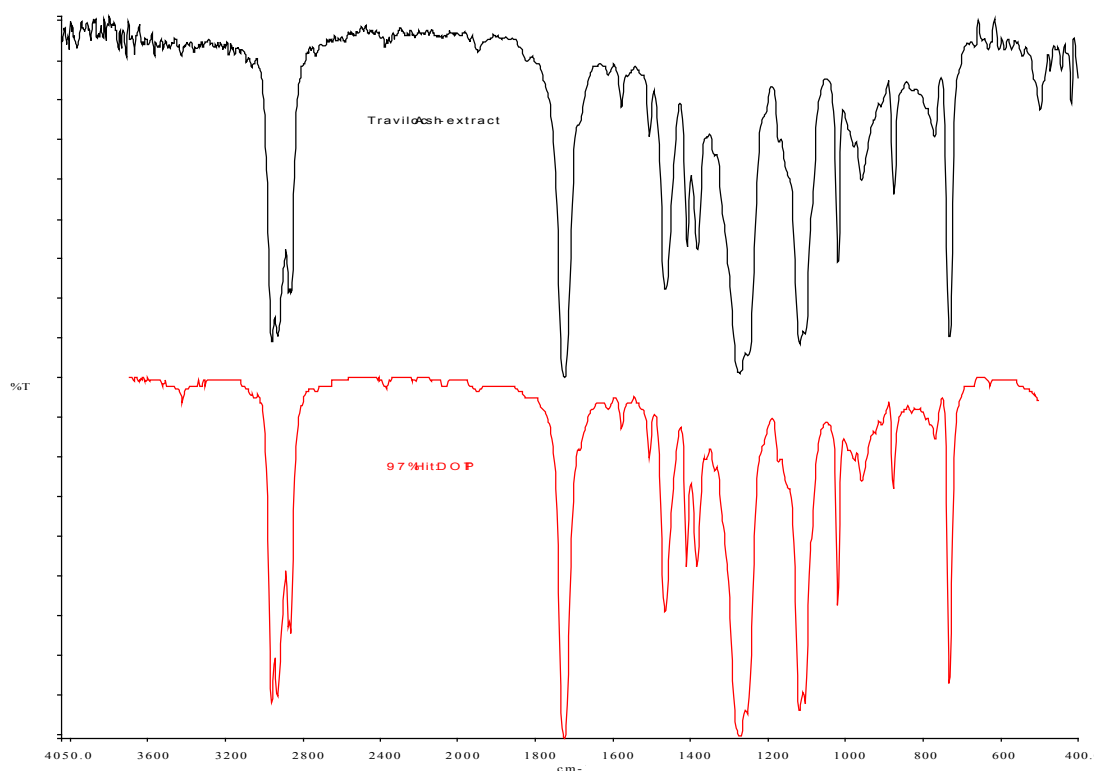
Mirror velocity (OPD)	=	0.1 cm/s
Resolution	=	8 cm <sup>-1</sup>
Source aperture	=	maximum
Spectral Range	=	450 – 4 000 cm <sup>-1</sup>
Number of scans	=	128
Sample reference	=	carbon black
Detector gas atmosphere	=	helium

A sample maximum 9 mm in diameter was placed in the sample holder cup, allowing a minimum amount of gas above the sample which is flushed with helium to illuminate any air from the sample compartment. A typical scan requires fifteen minutes scan time. This allowed enough time for the sample temperature to equilibrate and hence, to obtain a quantitative measurement controlling the room temperature was not necessary.

All the infrared spectra are scanned from wave number 4000 to 450 cm<sup>-1</sup> and the spectra are subsequently mathematically adjusted to compensate for the photoacoustic effect.



**FTIR spectra of the Elemental Cherry extract and its electronic search library hit: Kodaflex DOTP – Bis(2-Ethylhexyl)Terephthalate**



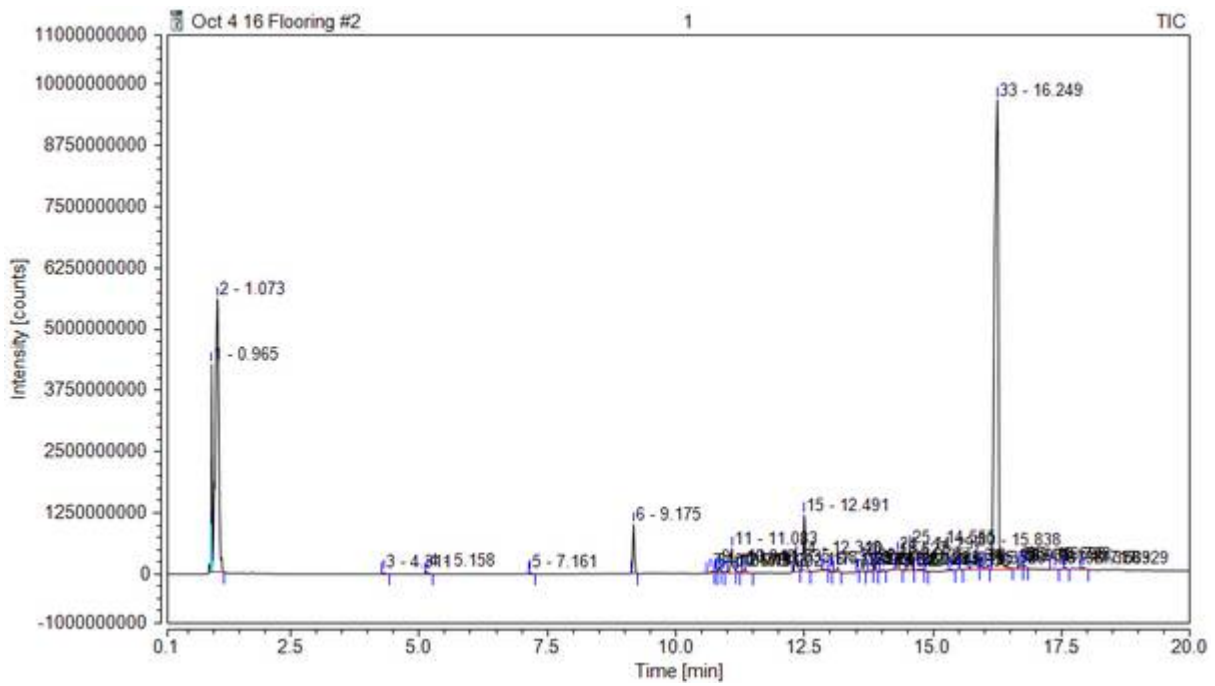
**FTIR spectra of the Travilloc Ash extract and its electronic search library hit: Kodaflex DOTP – Bis(2-Ethylhexyl)Terephthalate**

**EU method 10/2011 on GC-MS**

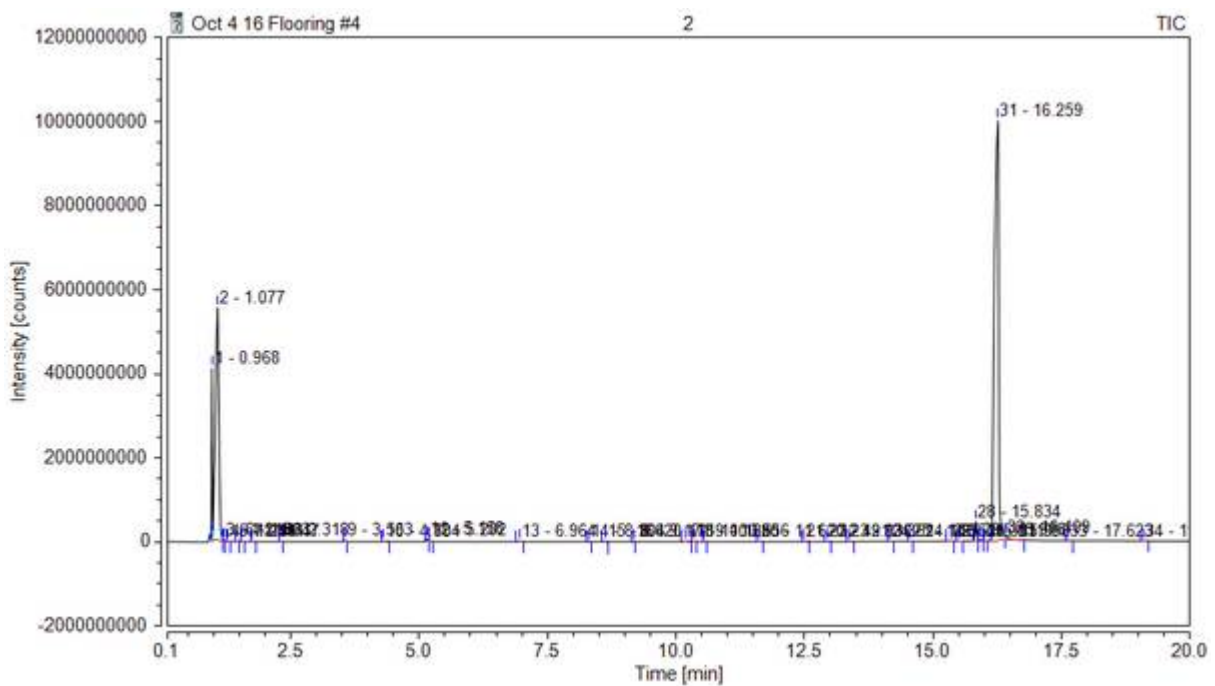
Column type:	Capillary
Column coating:	ZB-1MS
Column dimensions:	30 m, 0. ID, 1.00 micron
Injector temperature:	250 °C
Split Injection:	1:20
Front Inlet Flow:	2 mL/min.
Carrier gas:	Helium
Initial oven temperature:	150 °C
Initial time:	0 min
Ramp at:	10 °C/min.
Final oven temperature:	310 °C
Time @ final temperature:	14 min.

**MS conditions**

Transfer line:	280 °C
Ion source:	280 °C
Ionisation mode:	EI
Scan range:	30 – 600 amu

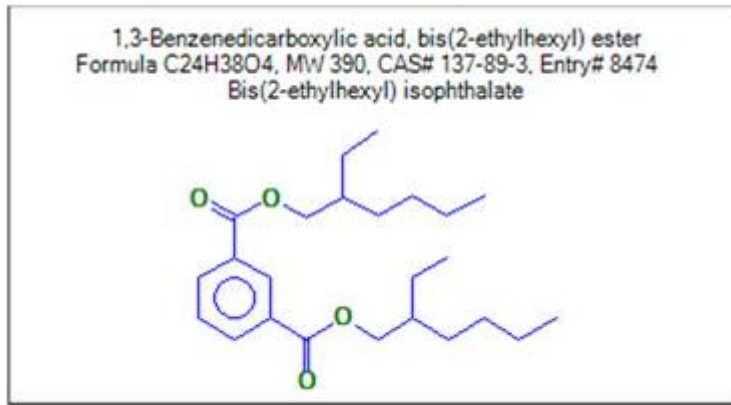


**GC-MS trace of extractant of ELC001 Elemental Cherry**

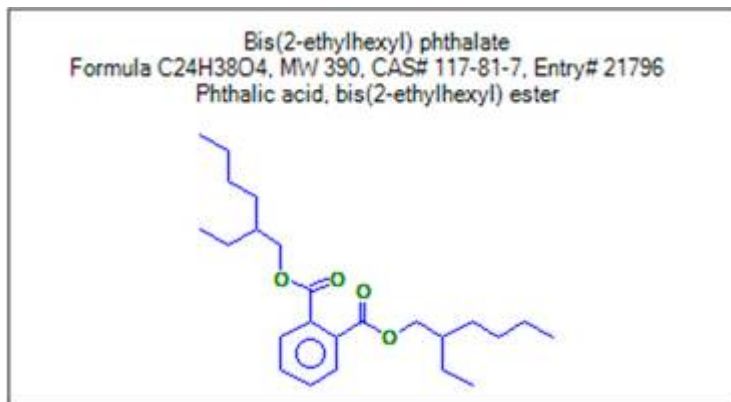
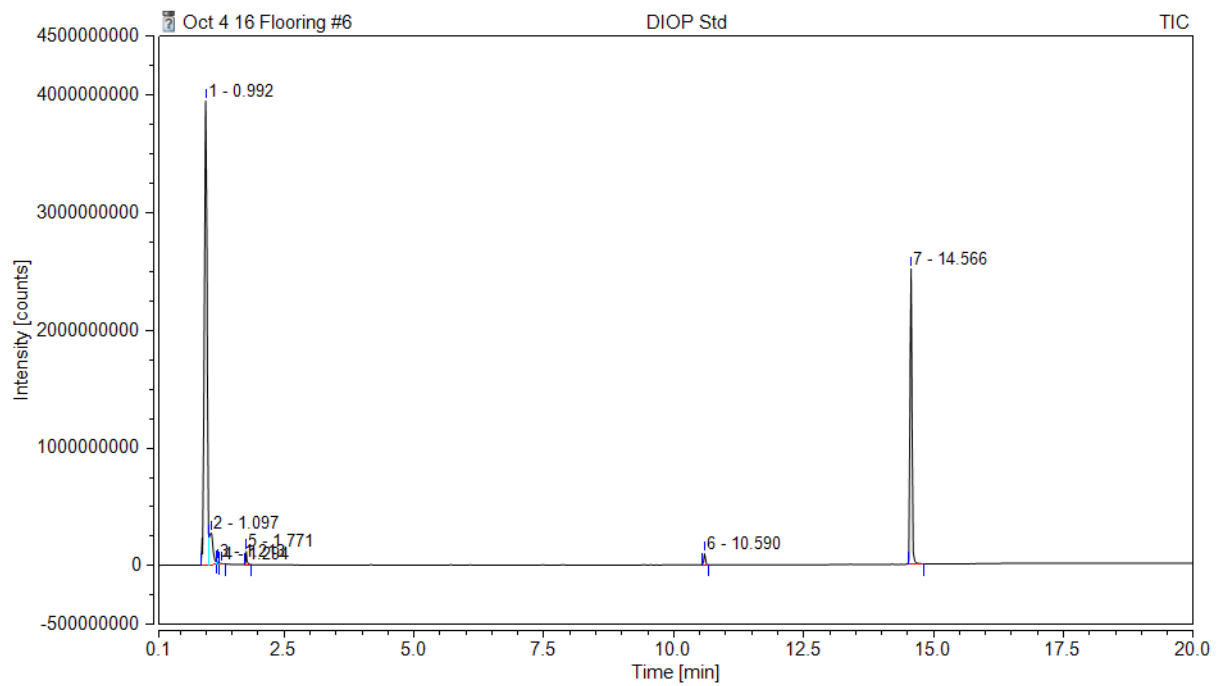


**GC-MS trace of extractant of TR5005 Traviloc 5.0**

Retention times (in minutes) and chemicals found.



16.26



14.57

**Summary**

1. No heavy metals are present in either of the flooring boards.
2. There are no Polybrominated Biphenyls (PBBs) in either of the samples.
3. Both flooring boards contain a terephthalate plasticiser but not a straight phthalate in the percentages tabulated below.

Sample	Plasticiser (%)
ELC001 Elemental Cherry 2.93 m <sup>2</sup> pb by Aspecta	7.64
TR5005 Traviloc 5.0 Droplock Georgian ash Bartow 107411	6.70

Phthalates (%)		
ELC001 Elemental Cherry 2.93 m <sup>2</sup> pb by Aspecta	DBP	0
	DEHP	0
	BBP	0
	DINP	0
	DNOP	0
	DIDP	0
	Heavy metals (%)	
	Cadmium (Cd)	0
	Lead (Pb)	0
	Mercury (Hg)	0
	Chromium (Vi) (Cr)	0
	Polybrominated Biphenyls (PBBs)	0
	Polybrominated Diphenyl Ethers (PBDEs)	0

Phthalates (%)		
TR5005 Traviloc 5.0 Droplock Georgian ash Bartow 107411	DBP	0
	DEHP	0
	BBP	0
	DINP	0
	DNOP	0
	DIDP	0
	Heavy metals (%)	
	Cadmium (Cd)	0
	Lead (Pb)	0
	Mercury (Hg)	0
	Chromium (Vi) (Cr)	0
	Polybrominated Biphenyls (PBBs)	0
	Polybrominated Diphenyl Ethers (PBDEs)	0

Both products contain no harmful chemicals as far as could be established using the methods cited above. The plasticisers found are iso or terephthalates which are not considered as a health risk.

Yours faithfully,



Dr. AHA Roediger.