

# Greenpeace Research Laboratories Analytical Results 2019-04

## Identification of polymer type used for a selection of organic-certified tampon applicators and their packaging on sale in the UK

September 2019

### Introduction

Individual boxes of four brands of organic-certified tampons were received by the Greenpeace Research Laboratories from a private individual for analysis in May 2019. Details of the products received are listed in Table 1. The focus of the analyses requested was the polymer (plastic) applicator and the wrapper in which it was packaged in each case, rather than the absorbent material itself.

For each sample, freshly removed from its individually-sealed outer packaging/wrapping, a small section from the tip of the applicator was removed and subject to analysis using Fourier-Transform Infrared (FT-IR) spectroscopy in order to identify the polymer from which it was made. A section of the packaging in which each applicator was individually wrapped was also subject to the same analysis.

Sample description	GRL laboratory code
L Organic cotton tampons	NGP19006
O.B. Organic tampons	NGP19007
Seventh Generation Free & Clear tampons	NGP19008
Cora Premium organic cotton tampons	NGP19009

Table 1: details of samples received and analysed at the Greenpeace Research Laboratories

### Materials and methods

Fourier-Transform Infrared (FT-IR) analysis of the applicators and their individual packaging was conducted using a PerkinElmer Frontier spectrometer with a universal diamond-ATR attachment, and using a number of commercially available and custom-built spectral libraries to assist identification of polymer type from the spectra obtained.

More detailed descriptions of the sample preparation and analytical procedures are presented in Appendix 1.

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Greenpeace Research Laboratories  
School of Biosciences  
Innovation Centre Phase 2  
Rennes Drive  
University of Exeter  
Exeter EX4 4RN, UK

## Results and Discussion

### *Analysis of polymer type (applicators and wrappers)*

FT-IR (diamond ATR) analysis confirmed that all four of the applicators investigated were manufactured from polyethylene (PE) (see Annex 2 for detailed spectra). It is not possible to use FT-IR to distinguish between PE manufactured from fossil-derived carbon and PE manufactured from biological sources of carbon, as the PE itself yields identical FT-IR spectra, irrespective of source. The fate of PE from fossil- and bio-sources, both in the waste stream and in the environment, will also be the same; PE is an environmentally persistent plastic.

Analysis of the disposable outer wrapping of the individual applicators using FT-IR revealed that:

- Sample NGP19006 (L Organic cotton tampons) was wrapped in polypropylene (PP) film
- Sample NGP19007 (O.B. Organic tampons) was wrapped in polyethylene (PE) film
- Sample NGP19008 (Seventh Generation Free & Clear tampons) was wrapped in a cellulose-based film
- Sample NGP19009 (Cora Premium organic cotton tampons) was wrapped in a composite polymer film, with the inner surface identified as polyethylene (PE), possibly with residues of an antioxidant (used in PE products to slow degradation of the polymer), and the outer surface identified as a cellulose nitrate-based material, possibly with a polyethylene component.

Both PE and PP can, in theory, be recycled, providing these materials can be separated effectively from solid waste streams. Nevertheless, it is unclear what proportion of tampon applicators and the wrapping films in which they are contained will make it to segregated waste recycling, given their association with sanitary products. It is not clear whether the cellulose-based wrapping on the Seventh Generation product or the composite wrapping used for the Cora Premium product are amenable to recycling, and without further details of their composition and origin, it is also difficult to provide further indications on their potential for biodegradation.

## Acknowledgments

Access to the PerkinElmer Frontier FT-IR spectrometer and Spotlight 400 imaging FT-IR microscopy system was made possible under a Research Partnership Agreement between the Greenpeace Research Laboratories and PerkinElmer.

### **For further information, please contact:**

Dr David Santillo, Senior Scientist, Greenpeace Research Laboratories

## **Appendix 1: Details of methodologies**

### **FT-IR analysis for polymer type**

FT-IR analysis was carried out using a PerkinElmer Frontier MIR Spectrometer, using a universal diamond-ATR accessory. Each applicator sample was placed onto the diamond surface (after precleaning the surface with analytical grade ethanol and verifying cleanliness with a preview-scan) and a consistent force applied using the sample clamp.

FT-IR spectra (mid-infrared) were obtained for each sample by scanning in the wave number range between 4000 and 650  $\text{cm}^{-1}$ , at a resolution of 4  $\text{cm}^{-1}$ , and acquiring a minimum of 16 scans per item. All spectra obtained were processed using PerkinElmer's Spectrum software (version 10.5.4), enabling post-acquisition background subtraction and normalisation of the data and subsequent comparison against a number of commercially available spectral databases, including PerkinElmer's standard Polymers Library, as well as against a custom built database prepared in our own laboratory through analysis of a range of analytical standards of common plastics.

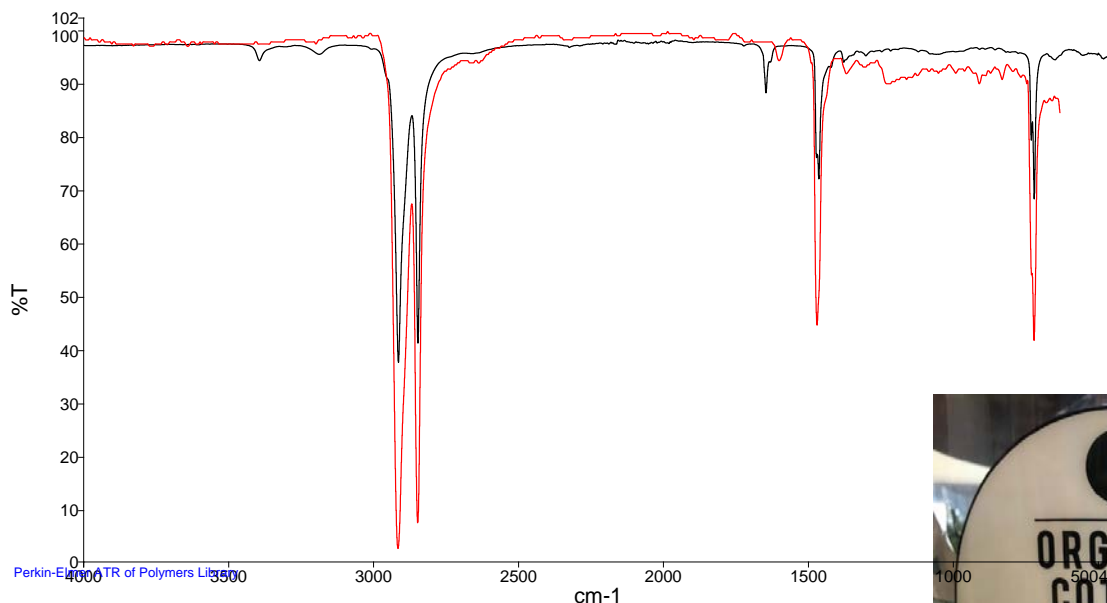
The PerkinElmer FT-IR spectrometer and microscopy system and all accessories and FT-IR spectral libraries used in this study were supplied by and purchased from PerkinElmer under a research partnership agreement with Greenpeace.

**Appendix 2: Detailed results from the FT-IR and GC-MS screening analyses**

Detailed data arising from FT-IR analysis of each of the samples are presented below.

# NGP19006: L Organic cotton tampons

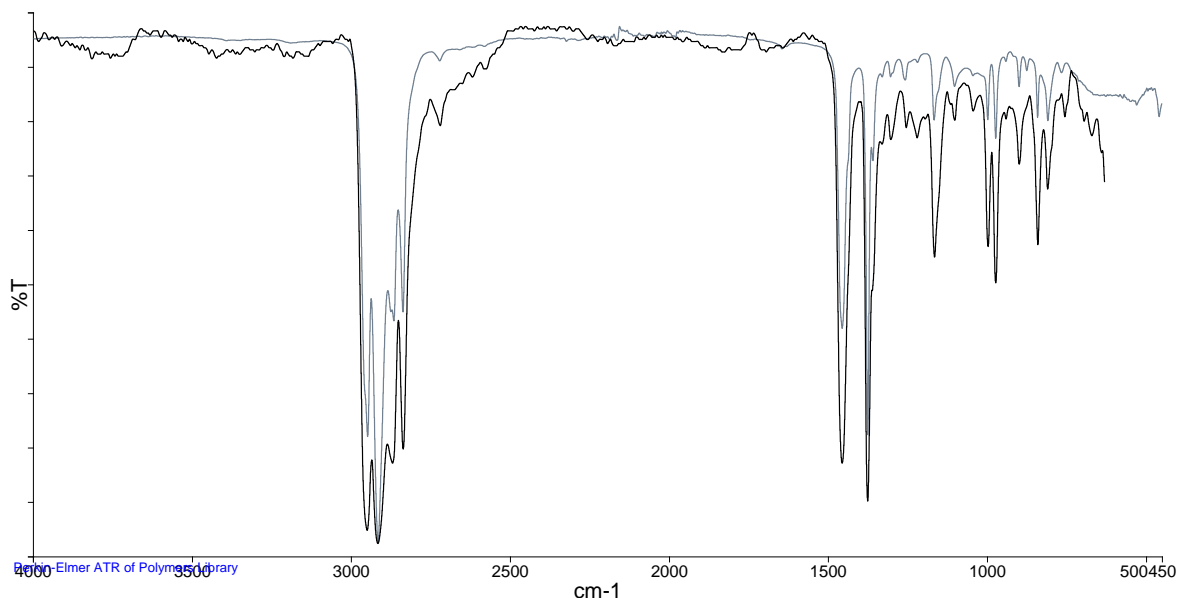
Applicator: Polyethylene (PE)



Name	Description
NGP-19006-ap	Sample 011 By Administrator Date Monday, July 01 2019
AP0049	POLYETHYLENE HIGH DENSITY



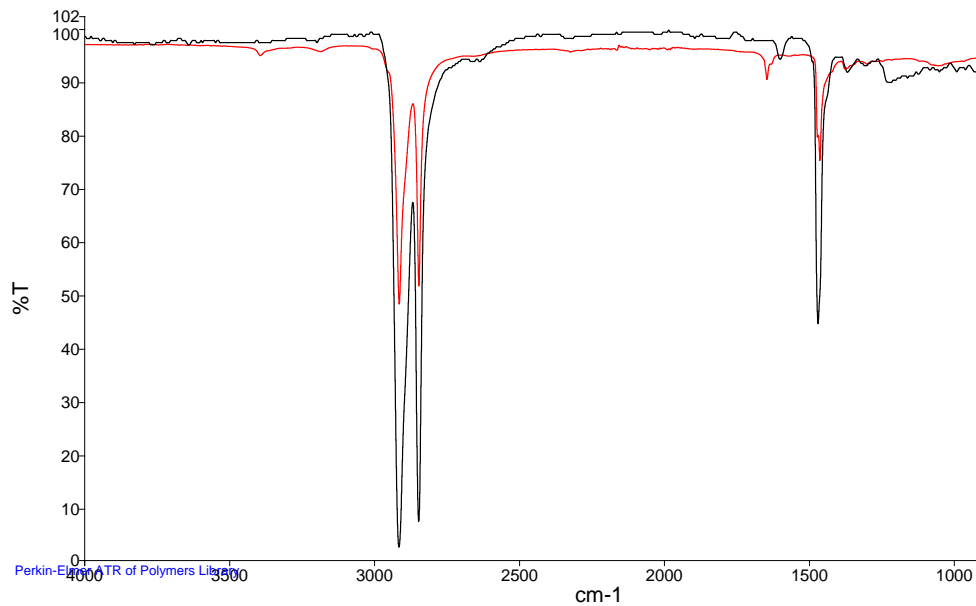
Wrapper: Polypropylene (PP)



Name	Description
NGP19006-wr	Sample 010 By Administrator Date Monday, July 01 2019
AP0065	POLYPROPYLENE, ISOTACTIC

# NGP19007: O.B. Organic tampons

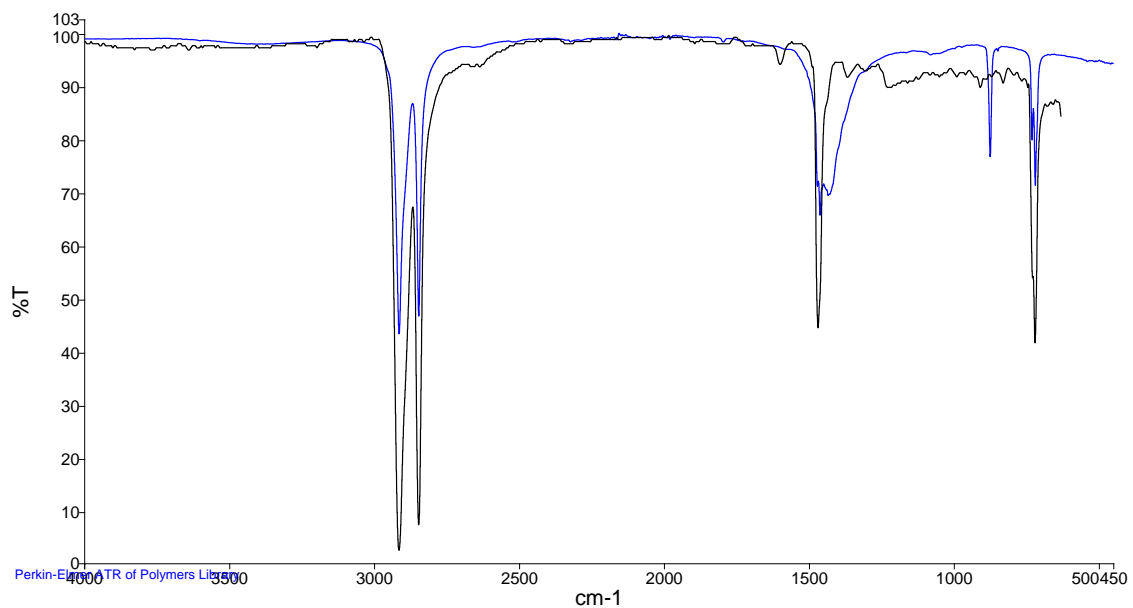
**Applicator: Polyethylene (PE)**



Name	Description
NGP-19007-ap	Sample 013 By Administrator Date Monday, July 01 2019
AP0049	POLYETHYLENE HIGH DENSITY



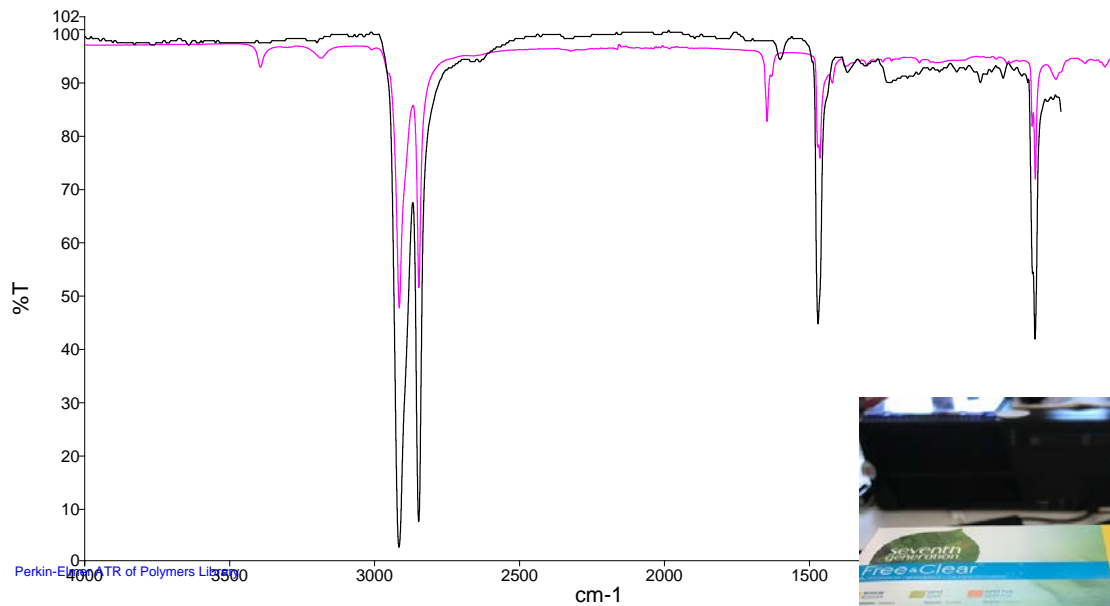
**Wrapper: Polyethylene (PE)**



Name	Description
NGP-19007-wr	Sample 012 By Administrator Date Monday, July 01 2019
AP0049	POLYETHYLENE HIGH DENSITY

# NGP19008: Seventh Generation Free & Clear tampons

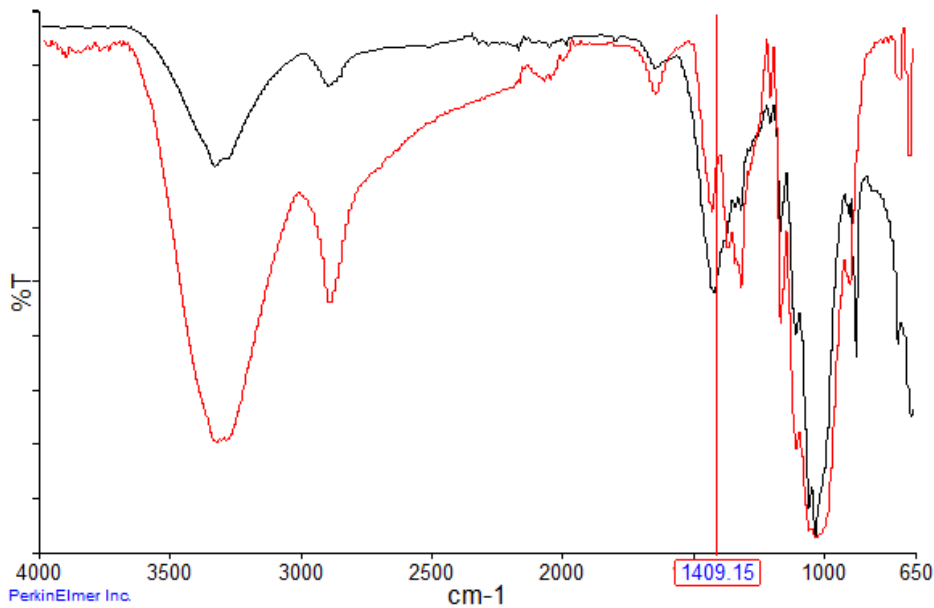
**Applicator:** Polyethylene (PE)



Name	Description
NGP-19008-ap	Sample 015 By Administrator Date Monday, July 01 2019
AP0049	POLYETHYLENE HIGH DENSITY



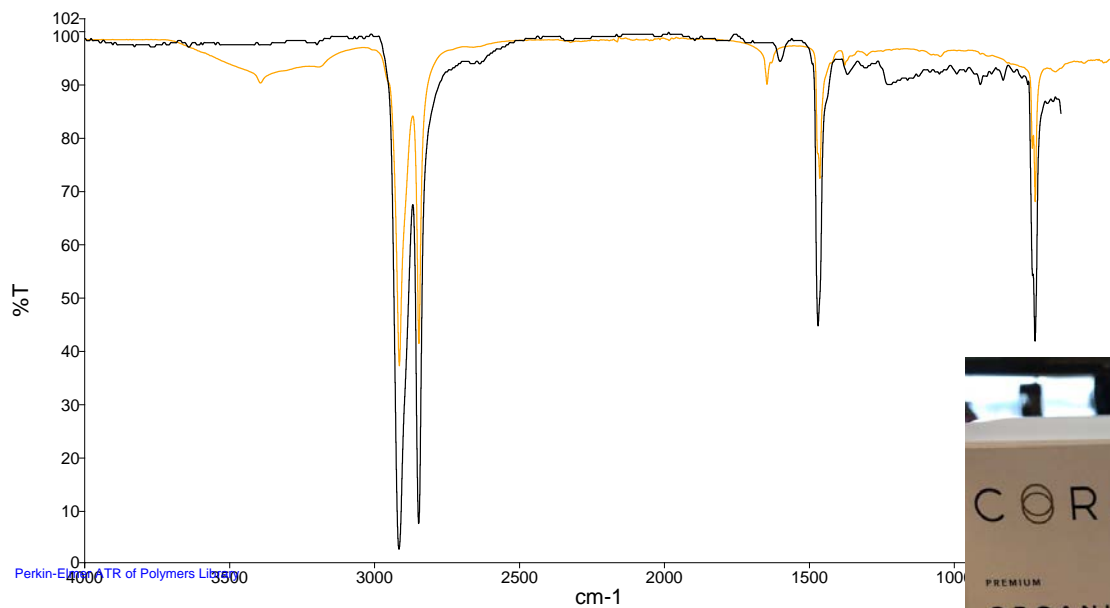
**Wrapper:** Cellulose-based product



Name	Cursor	Description
NGP19008 wrapper	92.168 %T	Sample 106 By Administrator Date Thursday, July 18 20
PC0474	73.585 %T	F11365.SP F11365AVICEL(R) PH-101, ~50 UM* BIOC

# NGP19009: Cora Premium organic cotton tampons

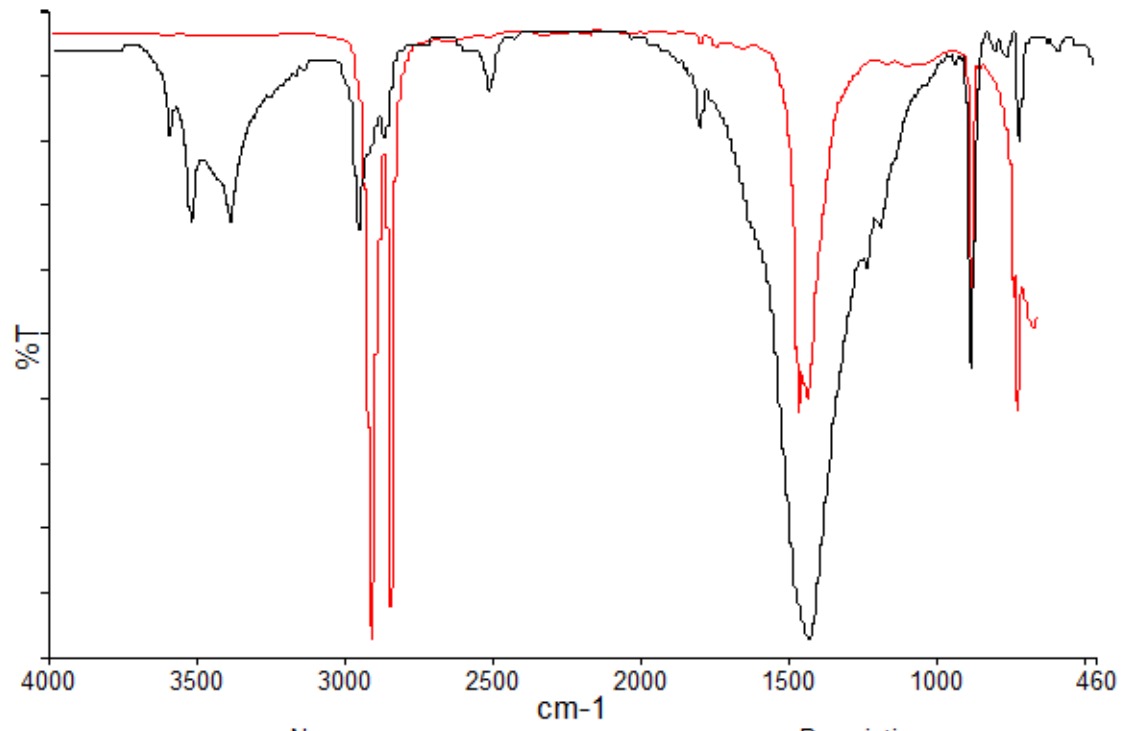
Applicator: Polyethylene (PE)



Name	Description
NGP-19009-ap	Sample 017 By Administrator Date Monday, July 01 2019
AP0049	POLYETHYLENE HIGH DENSITY



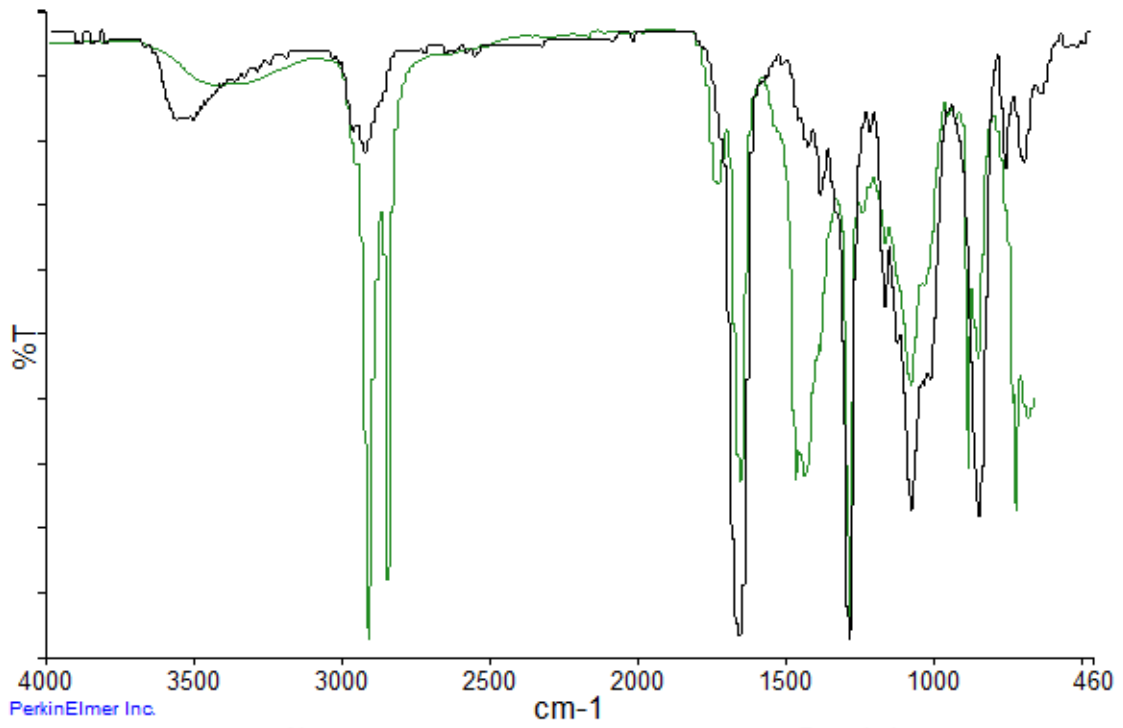
Wrapper (Inner Surface): possibly polyethylene base with antioxidant



Name	Description
NGP19009 wrapper inner surface	Sample 107 By Administrator Date Thursday, July 18 20
RB0149	CYANOX 53



**Wrapper (Outer Surface):** possibly cellulose nitrate-based material with polyethylene component



Name	Description
NGP19009 wrapper outer surface	Sample 108 By Administrator Date Thursday, July 18 20
HU0757	CELLULOSE NITRATE, 12.4%N FILM//CSI 0-00-0