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nhn/lel

## **Analysis of ecological biodegradable cinerary urn "ECOURN"**

### **Conclusion**

From the FTIR and X-ray analysis carried out by Danish Technological Institute on a sample of ECOURN and the background information given by ECOURN International, represented by director Joergen Mayland, it can be concluded that ECOURN is based on PLA (Poly(lactic acid) and natural minerals, mainly chalk, with a minor content of titanium dioxide.

PLA is a biodegradable polymer produced from renewable resources and will degrade 100 % to carbon dioxide and water, when buried via the enzymatic action of microbes and the natural minerals chalk and titanium dioxide (e.g. rutile) will be liberated.

The rate of degradation will depend on the soil and weather conditions (temperature, rain fall and humidity).

### **Background information**

The following background information has been available for the evaluation

- A sample of the ecological biodegradable cinerary urn "ECOURN"
- Brochure ECOURN "Back to Nature"
- SGS test report no. SZTYR061033963/LP, dated Oct. 18, 2006
- Test report no (2006) GSJ-161 SG: Modified PLA resin
- Test report no NTSQP (2004)C0831 – China National Centre for Quality Supervision & Test of Plastics Products, Oct. 29, 2004

The information in the brochure and test reports is listed in brief below.

In the brochure it is stated that ECOURN is biodegradable and made from 100 % bio-organic materials and other benefits are listed.

The SGS test report no. SZTYR061033963/LP, dated Oct. 18, 2006 claims that the sample of modified PLA complies with the requirement of US CONEG Model Toxics in Packaging Legislation, and European Council Directive 94/62/EC – Article 11 effective June 2001 with regard to total lead, cadmium, mercury and hexavalent chromium content.

The test report no. (2006) GSJ-161 SG: Modified PLA resin has analysed the sample named *modified PLA resin* by infrared analysis and concludes that the main component is PLA.

Test report no. NTSQP (2004) C0831 – China National Centre for Quality Supervision & Test of Plastics Products, Oct. 29, 2004 has tested a white biodegradable bag EnbioMat01F and found that the bag degraded 95.7 % after 45 days (ref. methods GB/T 19277-2003 (IDT ISO 14855:1999) The method is based on determination of the amount of carbon dioxide formed by biodegradation.

#### **Supplementary laboratory tests**

Danish Technological Institute has analysed the ECOURN by infrared analysis (FTIR) and by X-ray analysis (EDX).

From the FTIR test performed it can be concluded that ECOURN is based on PLA (Polylactic acid) and chalk.

The X-ray confirms the presence of calcium from the chalk in an amount of 37 % w/w calculated as calcium carbonate.

Further a smaller amount of titanium is found corresponding to 3.8 % w/w calculated as titanium dioxide.

No heavy metals were detected (lead, cadmium, mercury or chromium) by the X-ray analysis.

#### **Judgement**

Danish Technological Institute has several years of experience with biodegradable polymers in projects regarding biodegradable polymers for packaging of foods. One of the polymers studied has been PLA (Poly (Lactic Acid)).

PLA is produced by a ring opening polymerisation of the cyclic lactide of lactic acid. Lactic acid is produced from renewable biomass by fermentation.

PLA will start to biodegrade. By biodegradation the PLA macromolecules will break down by the action of a living system or via enzymes and thus cells.

As ECOURN is composed of PLA and natural minerals, mainly chalk, with a minor amount of titanium dioxide it will degrade when buried in soil. The rate of degradation will depend on the properties of the soil, of the enzymatic activity in the soil and the weather conditions (rainfall, humidity and temperature).

Yours sincerely  
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Enclosure: FTIR spectrum of the ECOURN sample and PLA reference.

Bilag 1

1220519-02

Absorbance

3,0 Urnematiale

Teknologisk Institut, Materialer, Plastteknologi

Urnematiale

Thu Apr 24 12:56:00 2008 (GMT+02:00)

P:\FTIR\Magna 2008\April 2008\04110.SPA

2,0

1,5

1,0

0,5

0,0

3,0 PLA

Teknologisk Institut, Materialer, Plastteknologi

PLA

Thu Apr 24 13:11:36 2008 (GMT+02:00)

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2,0

1,5

1,0

0,5

0,0

3500

3000

2500

2000

1500

1000

Wavenumbers (cm-1)

