Heat Resistant & Certified Compostable Utensils

By

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World Centric, a leading manufacturer of compostable food service products, recently revamped its line of biodegradable utensils to ensure full compostability. Their TPLA™ (70% non-GMO PLA and 30% Talc) utensils are carbon neutral, heat resistant up to 93°C (200°F) and certified compostable by BPI according to ASTM D6400.

With all the compostable resins available in the market, it would seem that it would be relatively easy to manufacture disposable utensils which are heat resistant to 85-100°C and also fully compostable. However, until recently there have been hardly any truly compostable, heat resistant and affordable utensils available (at least in the American market). PLA, the most widely used bio-polymer used for food service disposables is only heat resistant up to 50°C and utensils made from PLA are not suitable for hot drinks and food.

Many suppliers in USA have been selling their utensils marked as compostable or biodegradable, when they are actually neither. The most common resin still being used for manufacturing utensils is a starch based resin mixed with polypropylene (PP) or polyethylene (PE), yet being sold as biodegradable. The resin is cheap due to the high content of PP and PE and the use of this and other similar resins is a great disservice to end users, composting facilities and the field of bioplastics. Composting facilities find out that the utensils made from these types of resins do not biodegrade, have to be sifted out and put in the landfill. End users are fooled, articles are written about non-biodegradability of biodegradable utensils and the whole bioplastics industry gets a bad name.

World Centric commissioned several studies to determine the plastic content and hence the compostability of widely available utensils in the American market. These studies were carried out by reputable, independent laboratories and were done in Nov-Dec of 2009. Eleven heat resistant utensils manufactured by different manufactures were tested and all had PP content between 30-70%. Table 1, shows a typical composition profile of the starch based non-compostable utensils.

*Table 1 – Typical Composition of Starch Based **Non** Compostable Utensils*

Material	Relative Weight %
Carbohydrate	51.2
PP Random Copolymer	34.0
Calcium Carbonate	5.4
Wax	7.2
Volatiles	2.5

The samples were analyzed using Fourier Transform Infrared Spectroscopy (FTIR), Differential Scanning Calorimetry (DSC) and Thermogravimetric Analysis (TGA). FTIR analysis showed that for most of the starch based utensils the FTIR spectrum had absorbances associated with PP, carbohydrate, calcium carbonate and a wax-based additive. DSC analysis (Figure 1) showed a weak melting point at 74°C, associated with a melting point of the wax-based additive and a second thermal transition centered at 157°C associated with melting point of PP resin. TGA analysis (Figure 2) showed main decompositions of 47.4% associated with carbohydrate-based material and 31.7% associated with the PP resin.

Even after one year of these studies, non-biodegradable utensils are continuing to be sold as biodegradable, with still only few manufacturers of heat resistant compostable utensils certified by BPI. However, most of these BPI certified manufacturers are still continuing to sell non-compostable utensils as 'sustainable' and made from plant starch or corn starch material, without explicitly indicating that the utensils have PP content in them or that they are not compostable. This leads to further confusion by end-users and composting facilities, thinking that these plant starch based utensils are also compostable.

World Centric overriding goal is to ensure complete compostability in all of its food service products. They only manufacture compostable products and their TPLA line of compostable utensils are heat resistant, affordable, high quality and aesthetically pleasing. All of World Centric products are also carbon neutral, with offset purchases for raw materials to final delivery. "Our mission has always been to be at the forefront of environmental and social responsibility" said Aseem Das, CEO World Centric. "The studies highlight the need for our peers to closely examine their manufacturing processes and messaging to ensure the compostability of their products."

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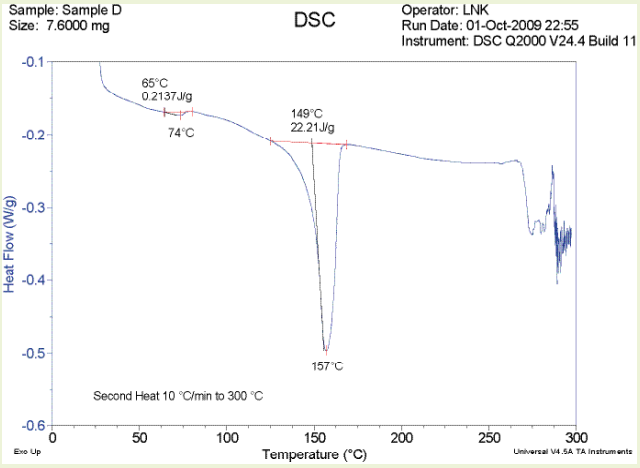

Figure 1 – DSC thermogram for a typical starch based non-compostable utensil

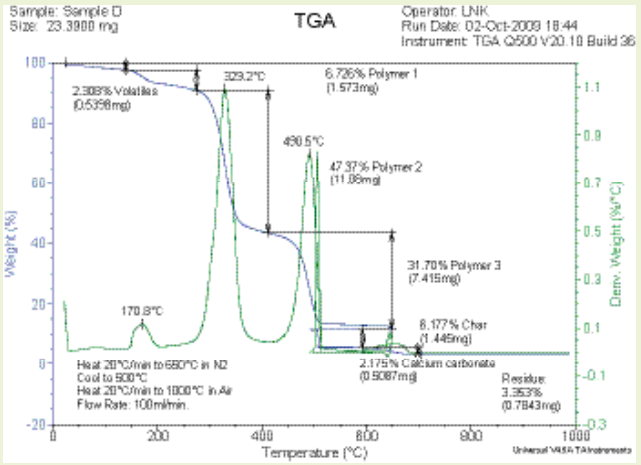

Figure 2 – TGA thermogram for a typical starch based non-compostable utensil

Editor's Note: bioplastics MAGAZINE has copies of at least ten independent lab analysis reports substantiating the statements in this article. Here are some anonymized quotations from these reports:

Report 1: It is the conclusion of this analysis that the material used to manufacture the BRAND XYZ Sample XYZ cutlery was a blend of 57.1% polypropylene (PP) block copolymer and a low molecular weight carbohydrate, such as dextrin.

Report 2: BRAND-XYZ biocompostable utensils were analyzed by LAB-XYZ. We found 96 wt% of the BRAND-XYZ material was insoluble in hot acidic water. The infrared spectrum of the insoluble BRAND-XYZ material indicates that it is polystyrene.

Report 3: PP block copolymer 39,4%

Report 4: PP homopolymer 40.5%

Report 5: PP homopolymer 34.0

Report 6: We found 73 wt% of the BRAND-XYZ material was insoluble in hot acidic water. The infrared spectrum of the insoluble BRAND-XYZ material indicates that it is isotactic polypropylene yarn.

Report 7: PP block copolymer 36.9%

Report 8: PP homopolymer 42.9%

Report 9: PP homopolymer 42.2%

Report 10: PP homopolymer 60.1%

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