



## HDPE<sup>13</sup>C Spheripol™ particles Technical Data Sheet

### Description:

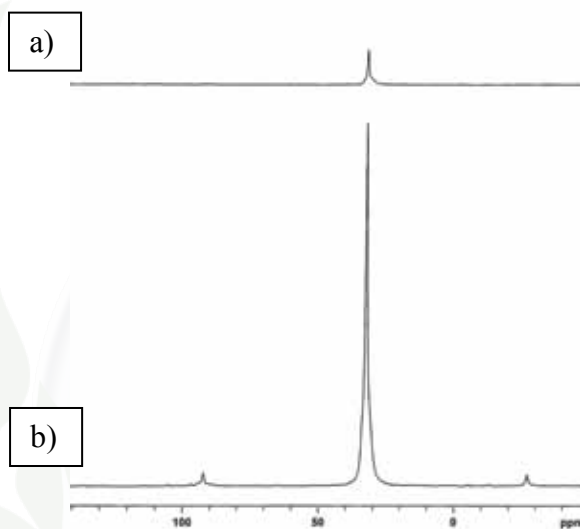
The labelled <sup>13</sup>C Polyethylene (PE) is a Homopolymer of Polyethylene and it is the raw material of the commercial grade Hostalen GX5044 which is a High Density Polyethylene (HDPE) produced by Lyondell Basell Ferrara - Italy.

### Synthesis:

The <sup>13</sup>C HDPE was synthesized by using a labelled Ethylene (1,2 -<sup>13</sup>C<sub>2</sub>, 99%), high purity grade and Ziegler-Natta catalysis system under the licensing of Spheripol™ Process – Lyondell Basell. The <sup>13</sup>C amount was fixed around 12% by weight obtained by diluting the labelled concentrated monomer into Ethylene monomer suitable for the synthesis of labelled polyethylene sample.

### Isotopic identification:

**Nuclear Magnetic Resonance – NMR** Solid State NMR 300 MHz, Bruker Avance Neo (4 mm probe head).



**NMR Spectra: a) Reference sample HDPE vs b) <sup>13</sup>C HDPE**

### Properties:

**Molecular Weight and Molecular Weight Distribution – (SEC or GPC)** GPCV2000 system from Waters (USA) equipped with a differential refractometer (DRI) as concentration detector by using o-dichlorobenzene (ODCB) as solvent Column Set: three Shodex HT (806M-805-804) from Showa Denko (Japan).

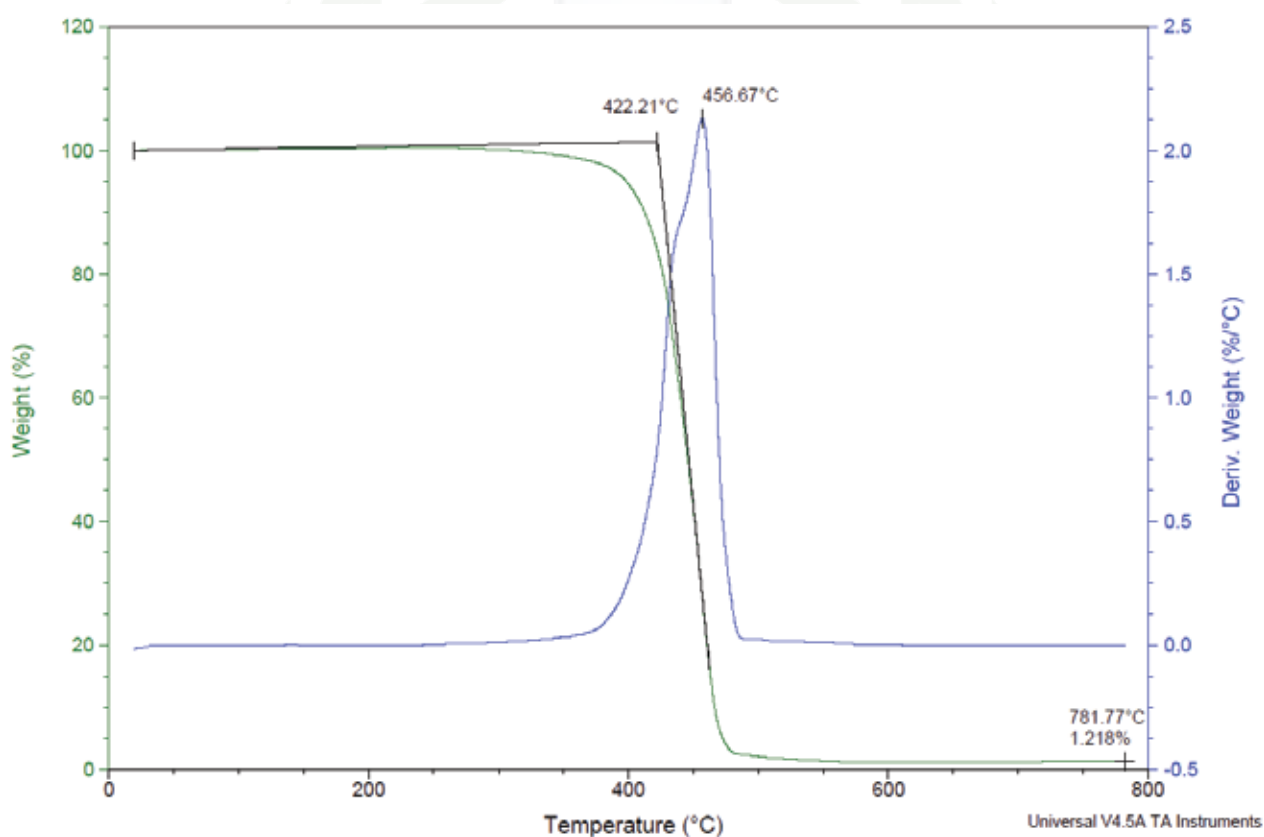
Sample	Mp g/mol	Mn g/mol	Mw g/mol	Mz g/mol	Mw/Mn	Mz/Mw
<sup>13</sup> C HDPE Spheripol particles	117,187	28,124	293,623	947,850	10.4	3.2

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### Thermal Analysis:

Thermogravimetric analysis TGA-DTG TGS Q500 TA Instrument.

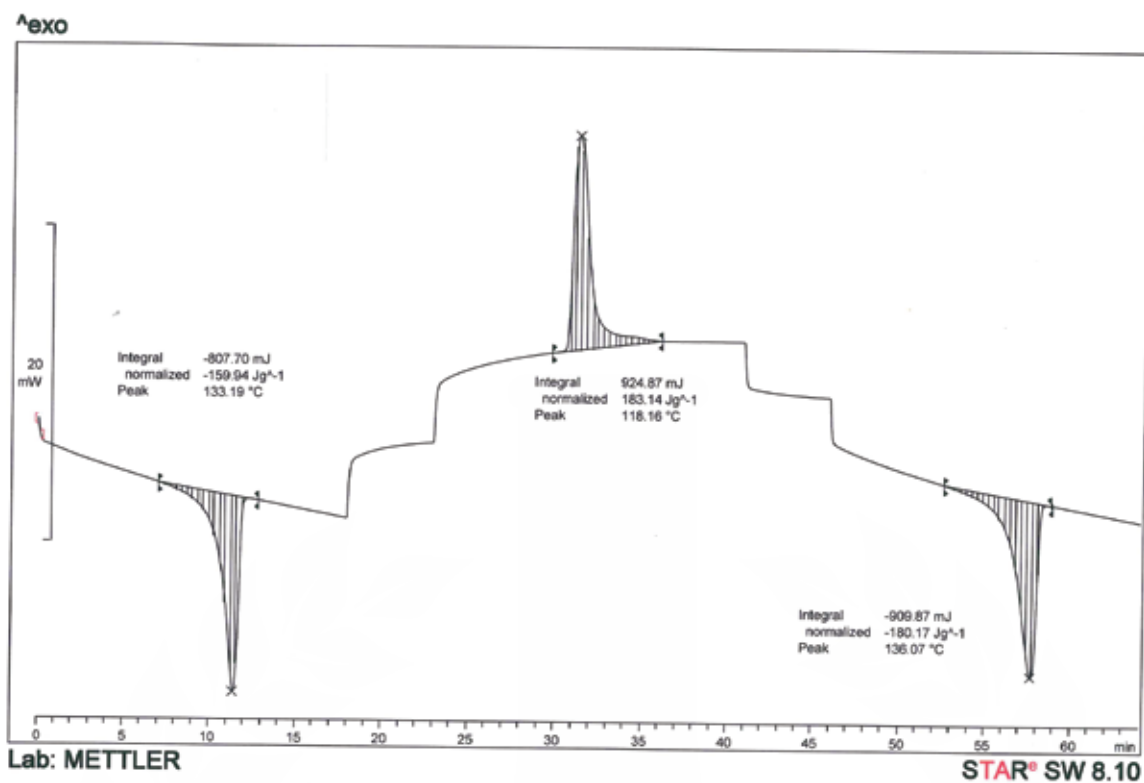
Sample	T° onset [°C]	T max [°C]	Residue [%]
<sup>13</sup> C HDPE Spheripol particles	422,21	456,67	1,22



Thermogravimetric curve <sup>13</sup>C HDPE Spheripol™ particles

### Differential Scanning Calorimetry – DSC Mettler Toledo

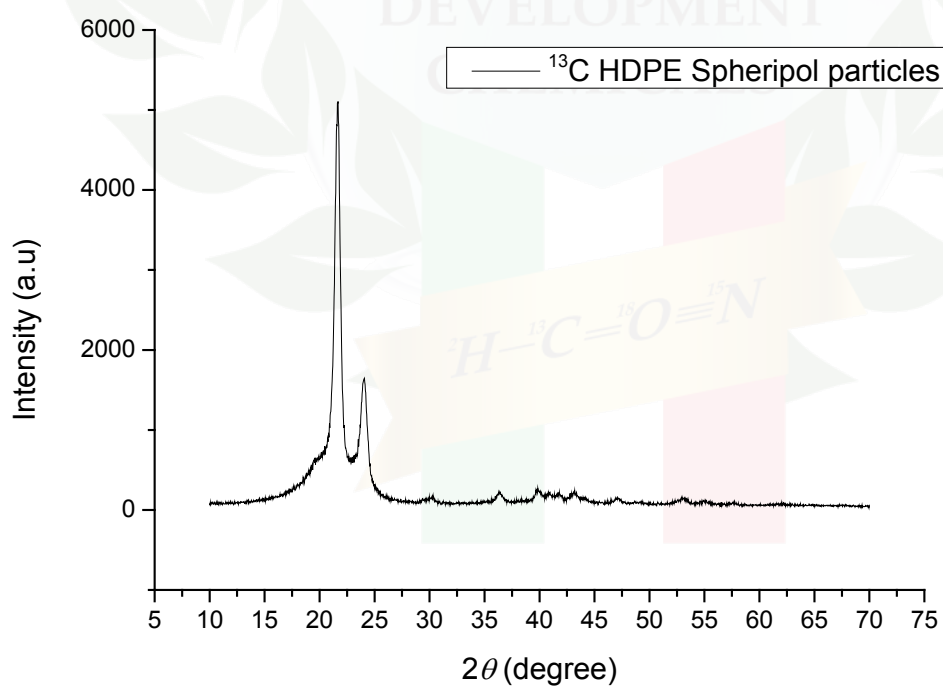
Sample	Tm peak °C	Tc peak °C	ΔHm J/g	ΔHc J/g
<sup>13</sup> C HDPE Spheripol particles	136	118	-180,17	183,14



Thermal traces of  $^{13}\text{C}$  HDPE Spheripol™ particles: 1<sup>st</sup> heating, cooling and second heating

### Structural Characterization:

X Ray - XRD Bruker D8 Advance Da Vinci.



Diffractogram of  $^{13}\text{C}$  HDPE Spheripol™ particles

