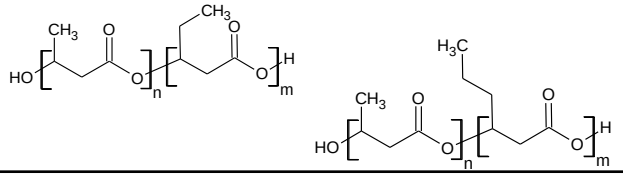
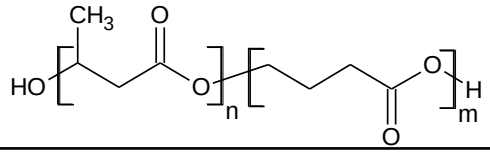
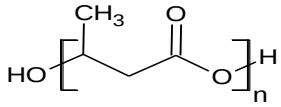
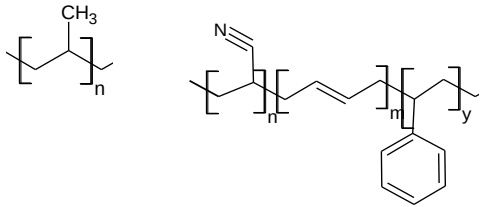
Thermal and biological disintegration of commercial PHA grades

Corinne van Noordenne

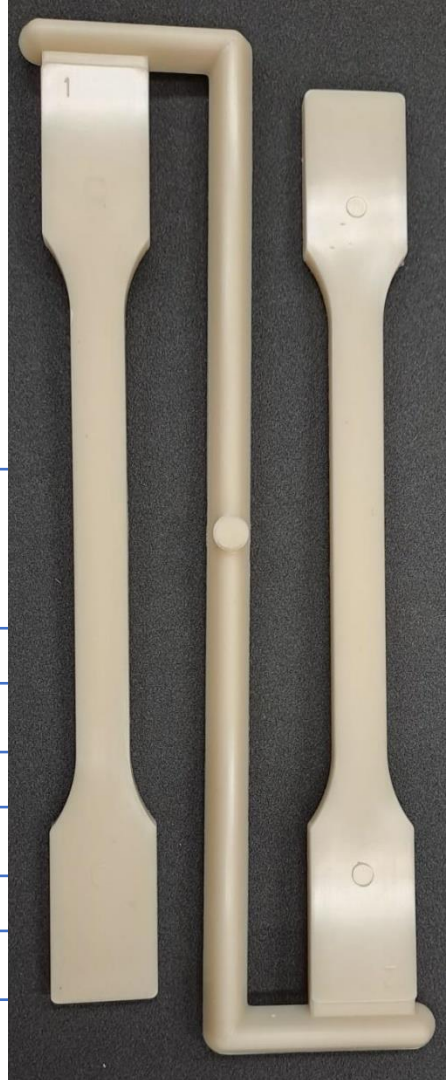
NHL STENDEN

Sample overview

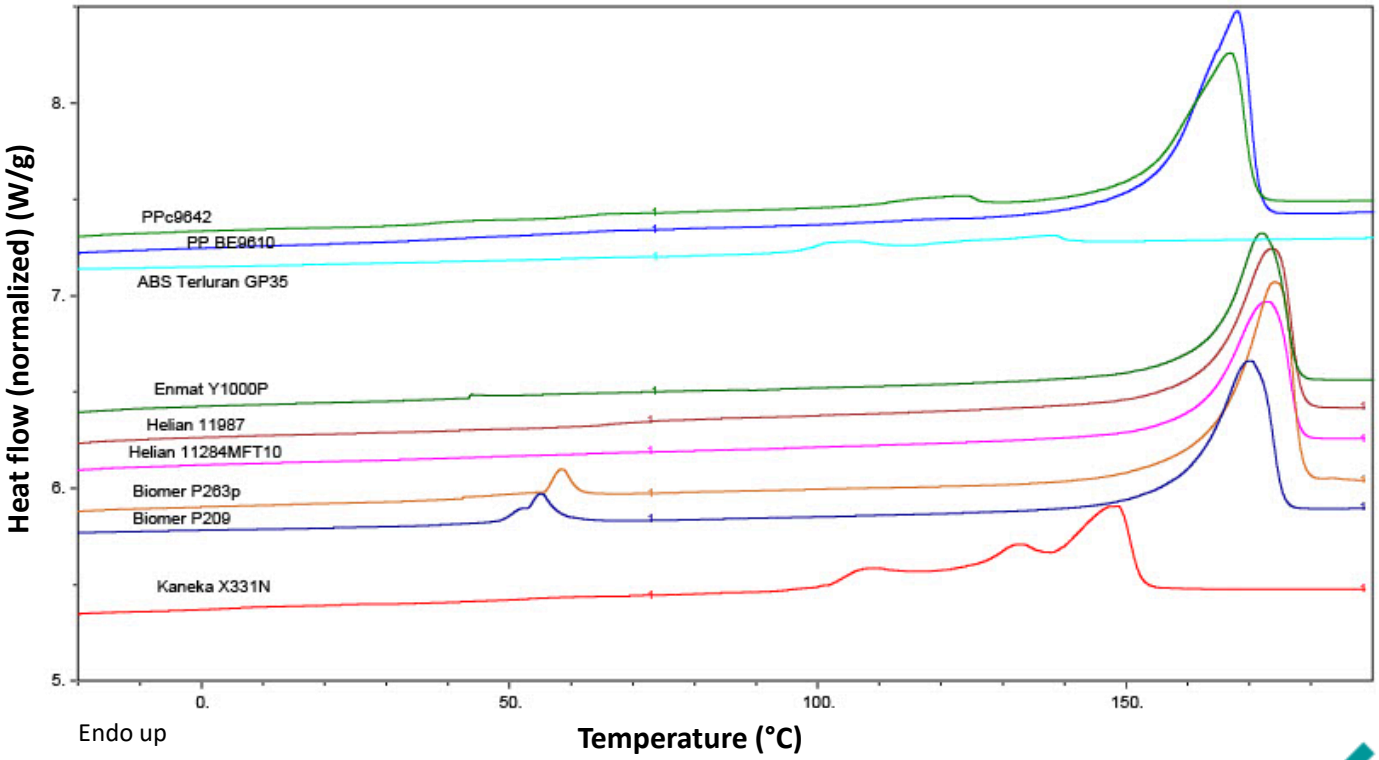
Sample name	PHA type	Chemical structure
Enmat Y1000P	PHBV	
Kaneka X331N	PHBH	
Helian PHAx 11284MFT10	P3HB4HB mineral filled	
Helian PHAx 11987	P3HB4HB	
Biomer P209	PHB	
Biomer P263p	PHB	
PP-c Total9644	PP	
PP-c Borealis BE961MO	PP	
ABS Terluran GP35	ABS	

Analysis techniques

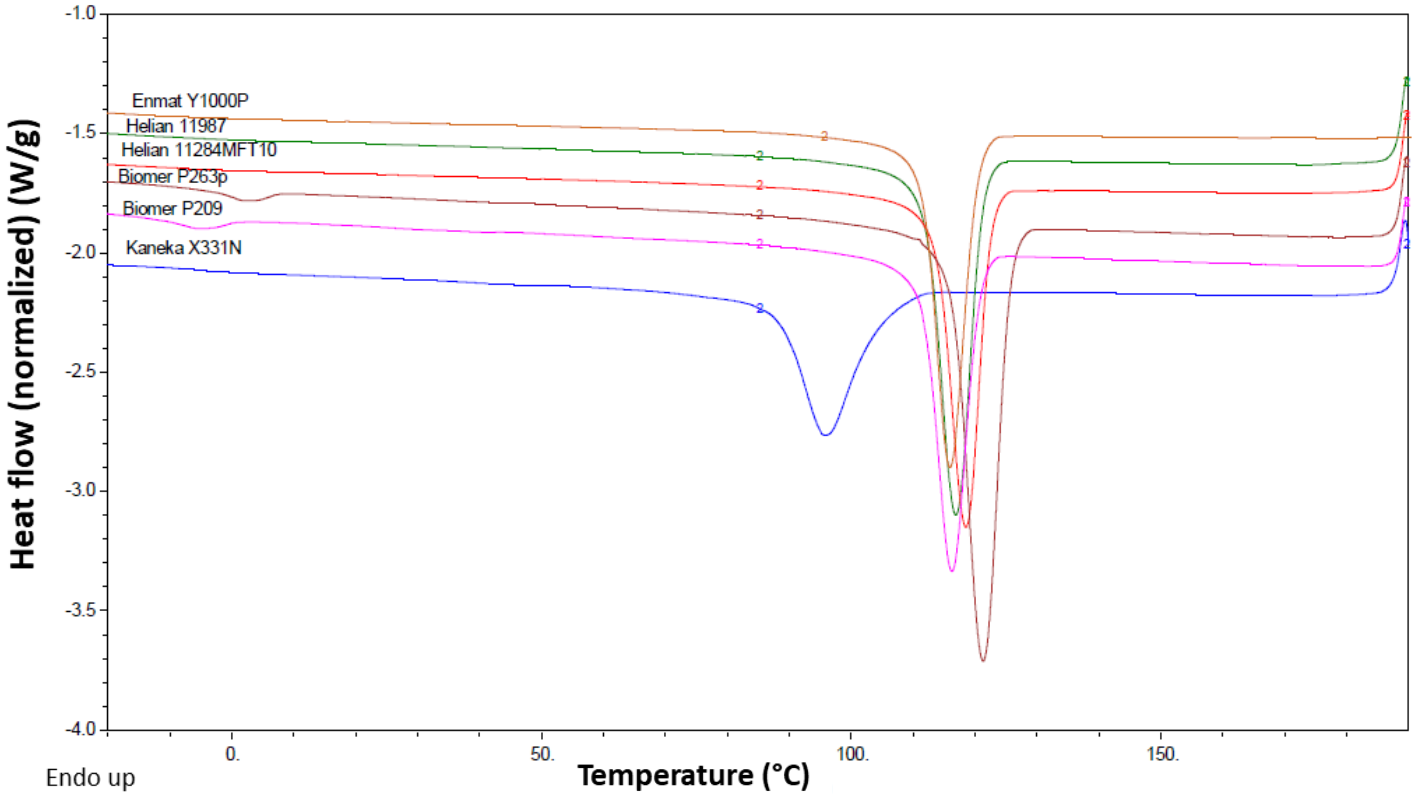
- Thermal analysis
  - Melting and crystallization
  - Dynamic mechanical
- Viscosity
- Mold Shrinkage
- Disintegration in soil



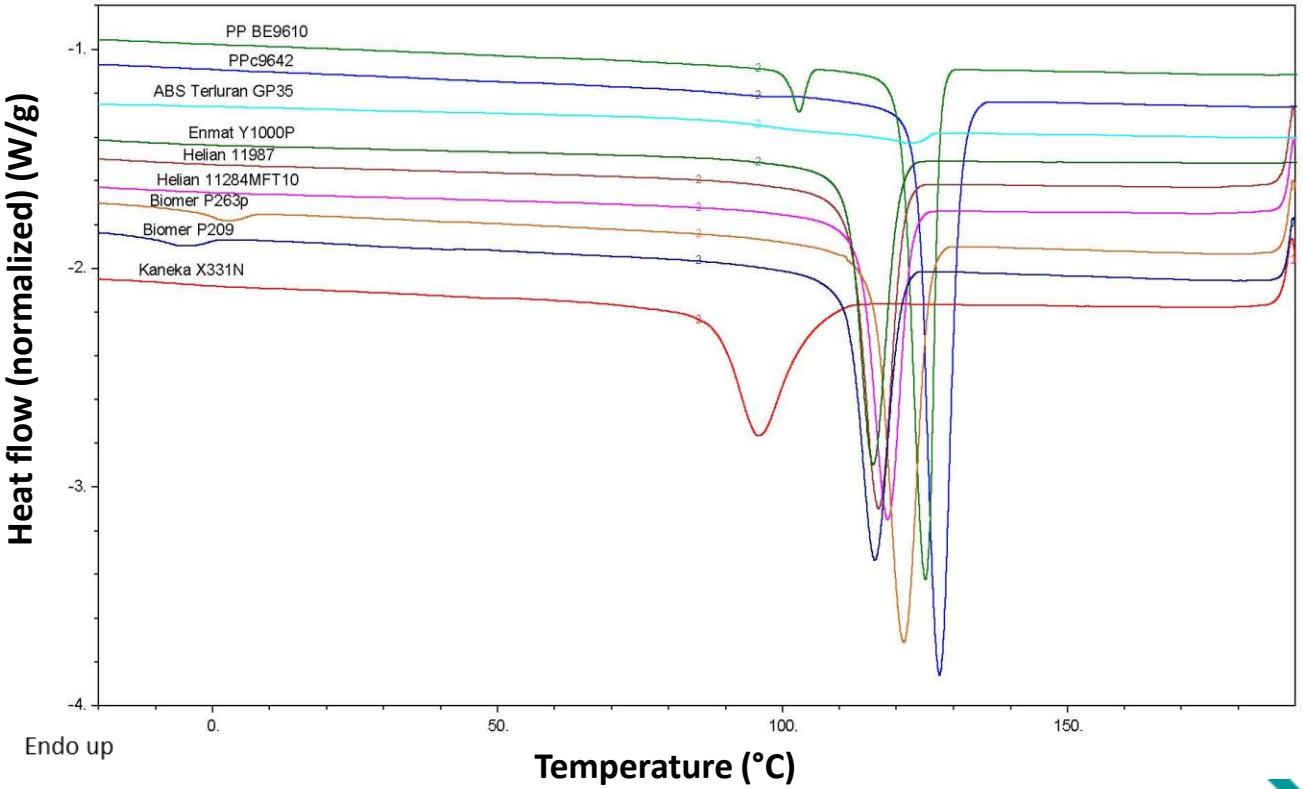
Melting behavior



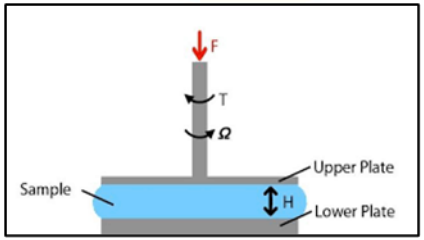
Crystallization behavior PHA's

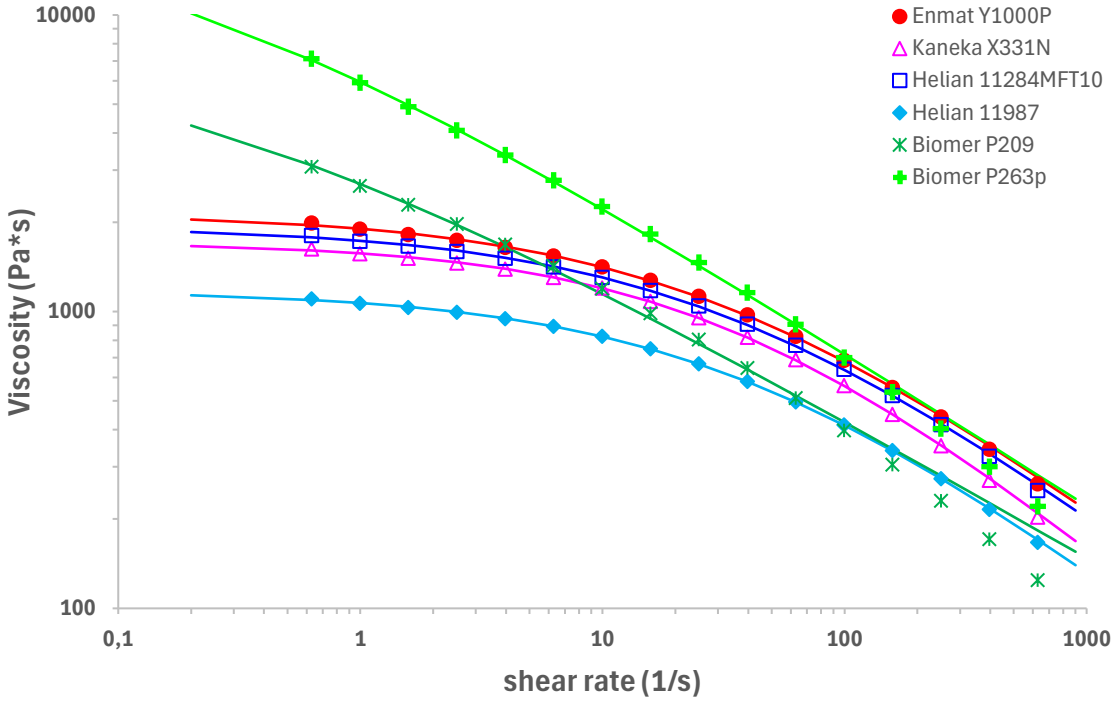


Crystallization behavior

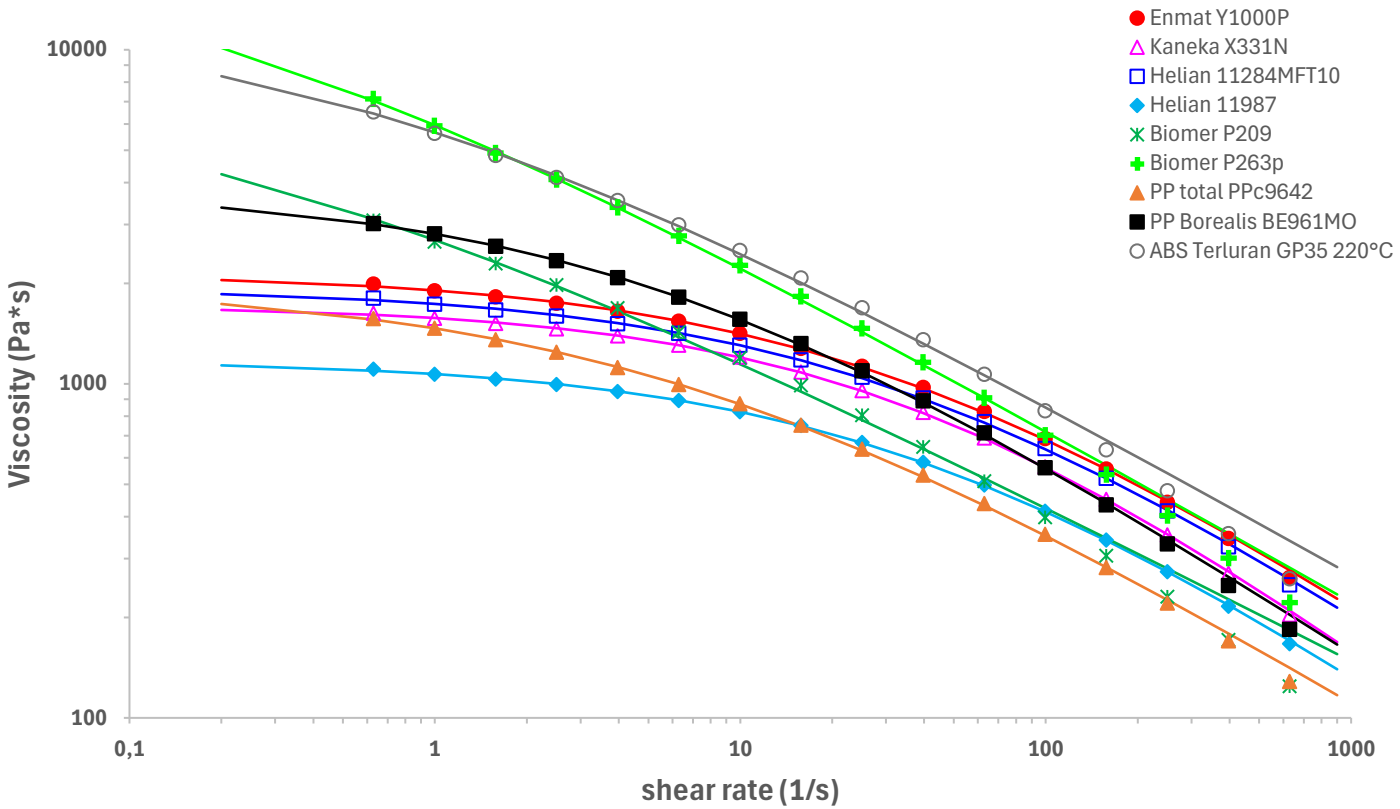


Melt viscosity of PHA at 180°C

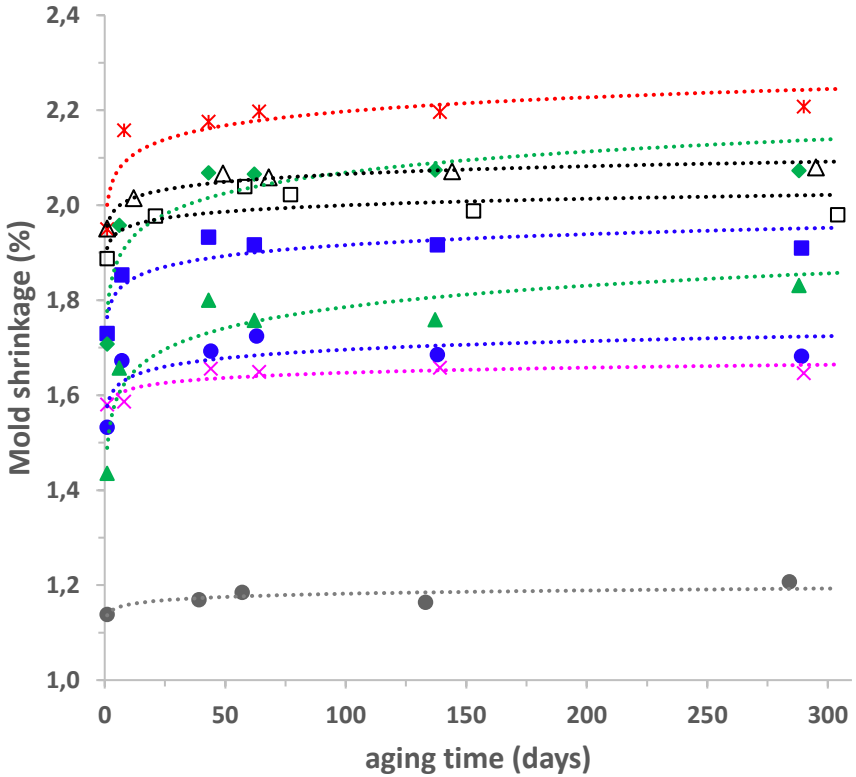




Melt viscosity at 180°C (ABS @220°C)

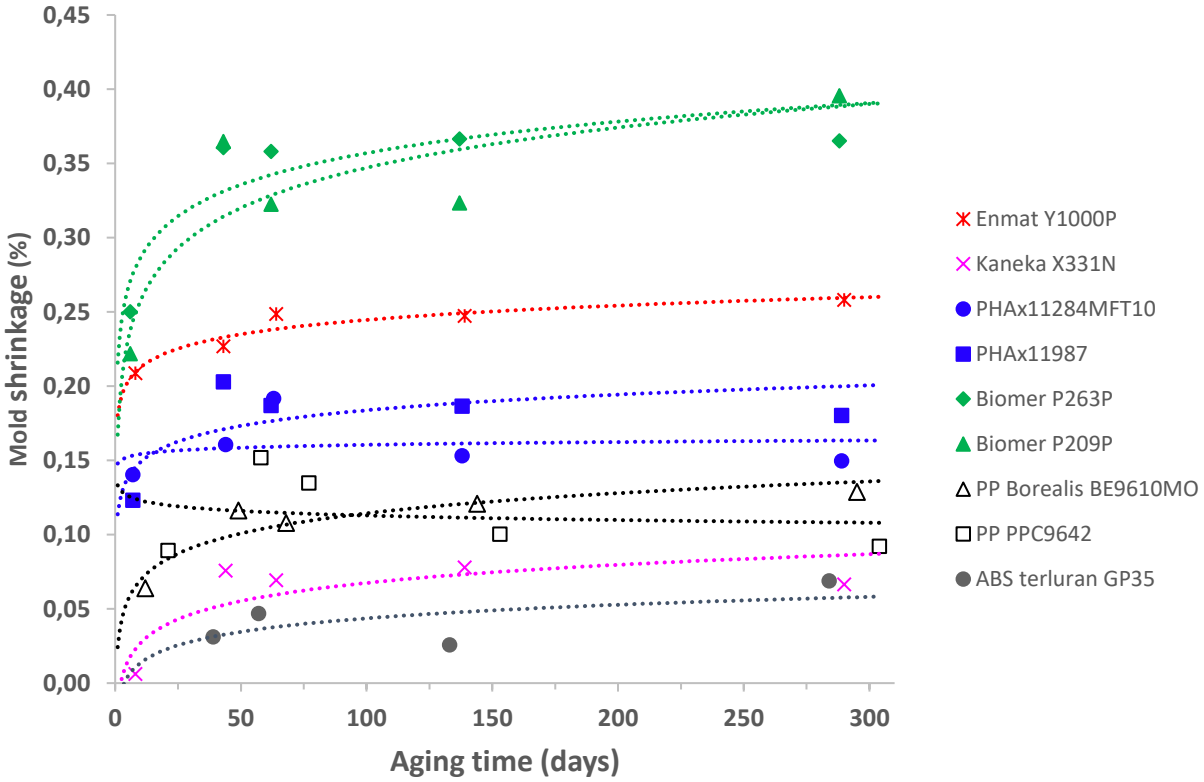


Mold shrinkage (200 bar holding pressure)

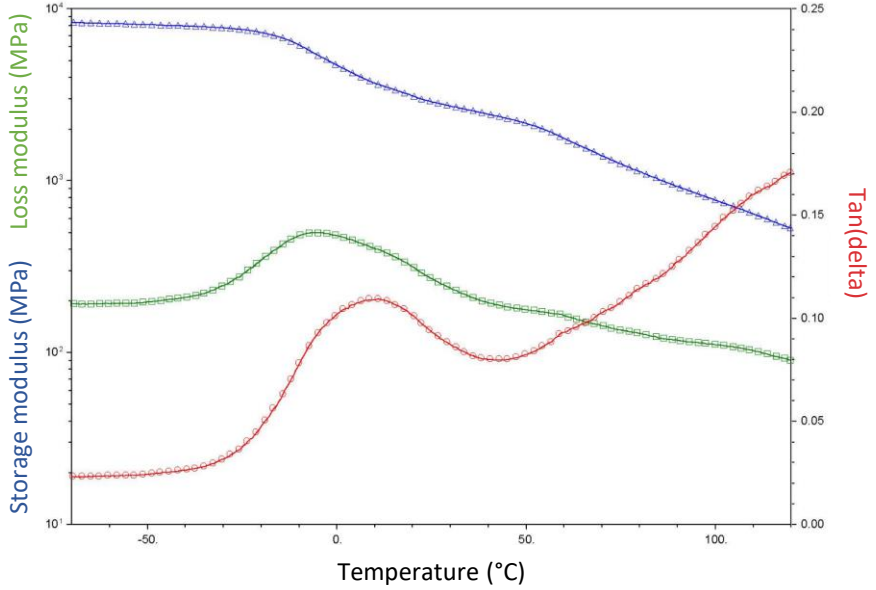


- Enmat Y1000P
- Kaneka X331N
- PHAx11284MFT10
- PHAx11987
- Biomer P263P
- Biomer P209P
- PP Borealis BE9610MO
- PP PPC9642
- ABS terluran GP35

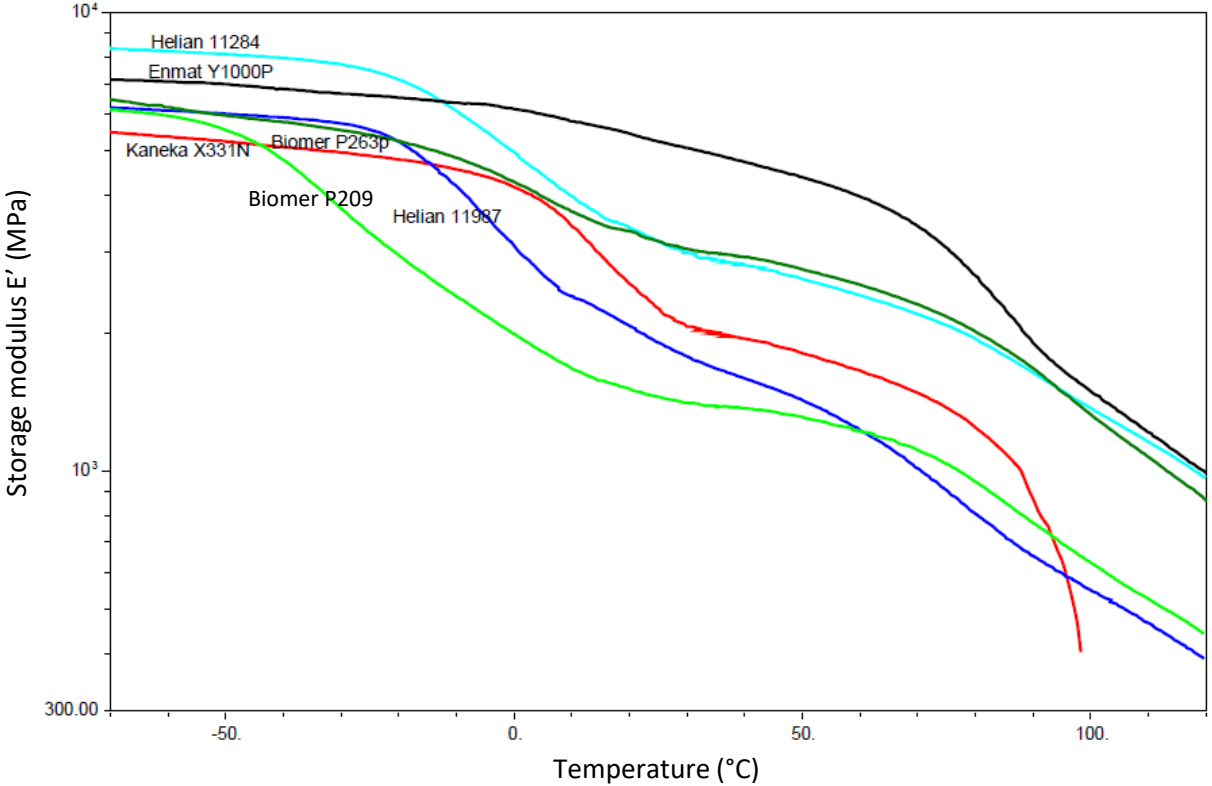
Extra shrinkage after 24 h



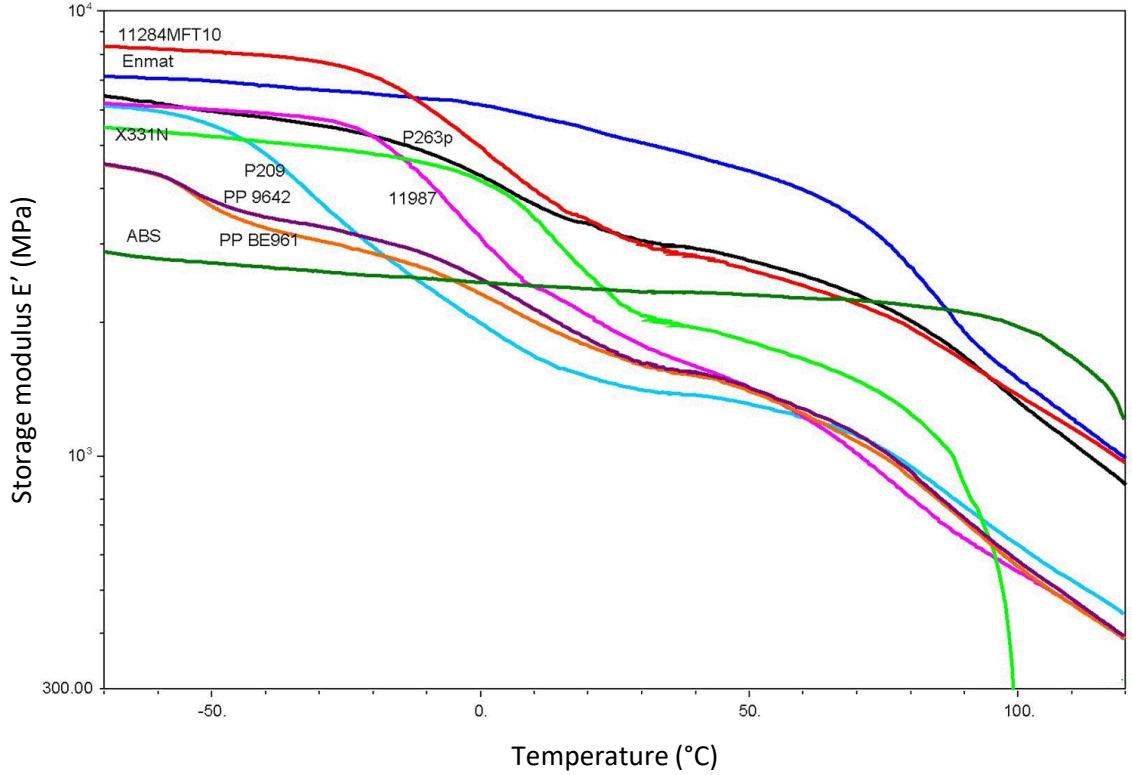
Dynamic mechanical analysis (DMA)



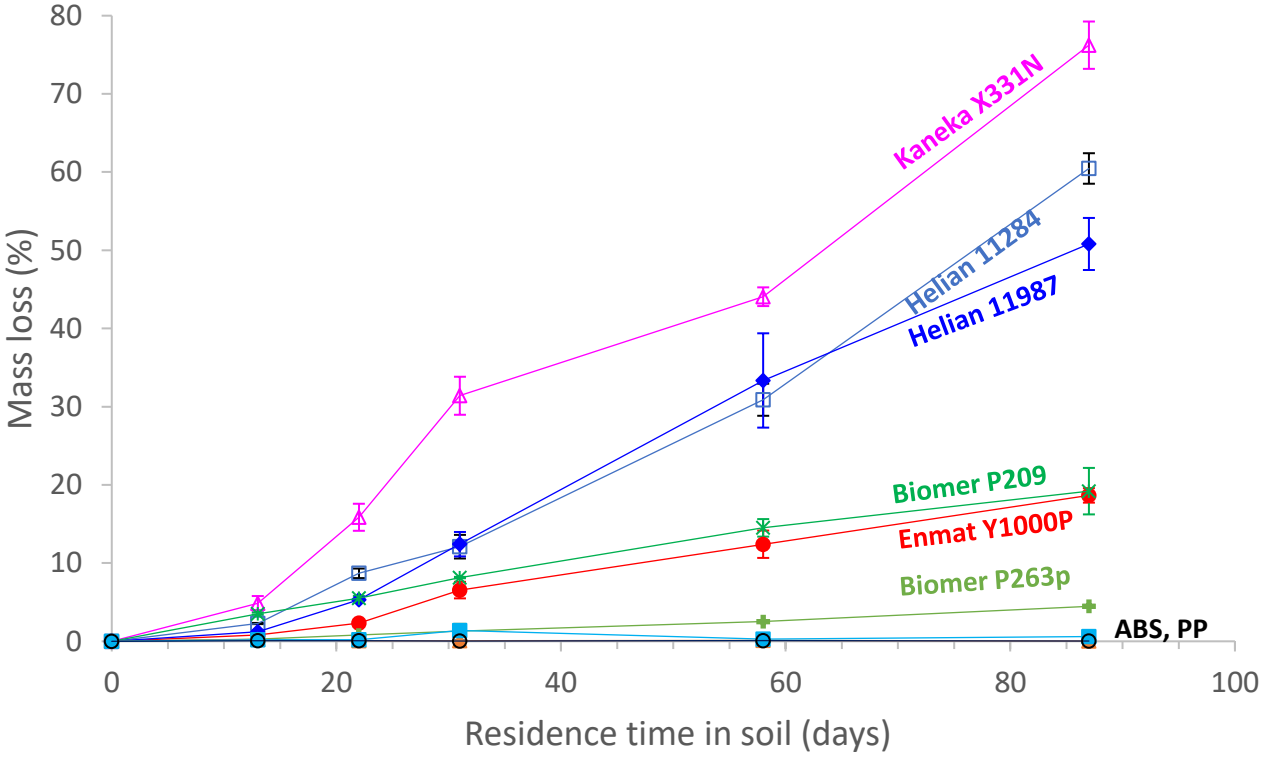
Storage modulus PHA's



Storage modulus



Disintegration in soil



Wrap up

- Melting temperature of PHB samples comparable to PP
- Crystallization slower
- Molt shrinkage depends on composition of the PHA
- Glass transition via storage modulus instead of DSC
- Disintegration is faster for samples with longer side chain (Kaneka) or more flexible main chain (Helian)

Thank you!

NHL STENDEN

Glass transition peak damping