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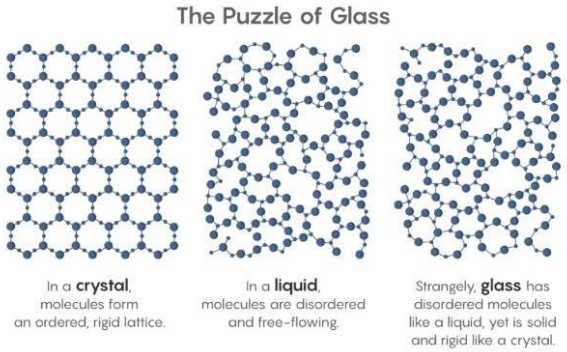
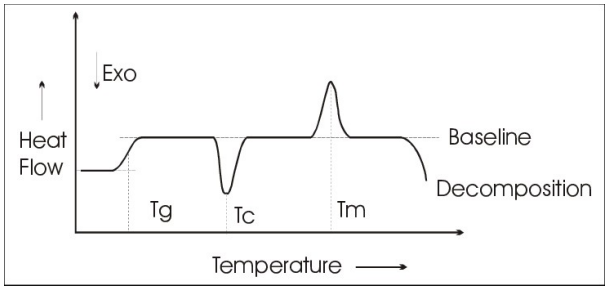
DQB | Departamento de Química e Bioquímica

Materials Properties and Applications

Melting, crystallization, and glass transition in polymers





José C. S. Costa

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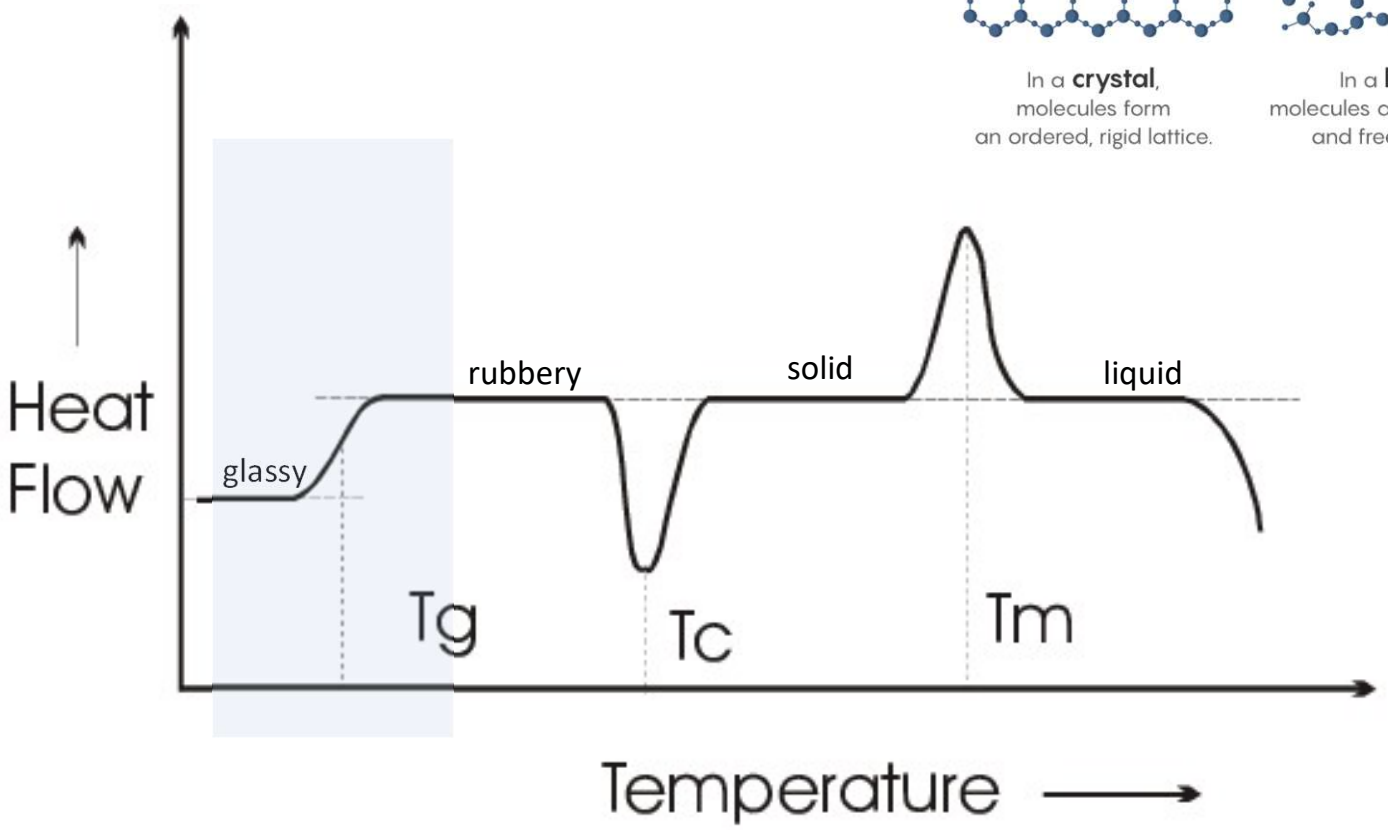
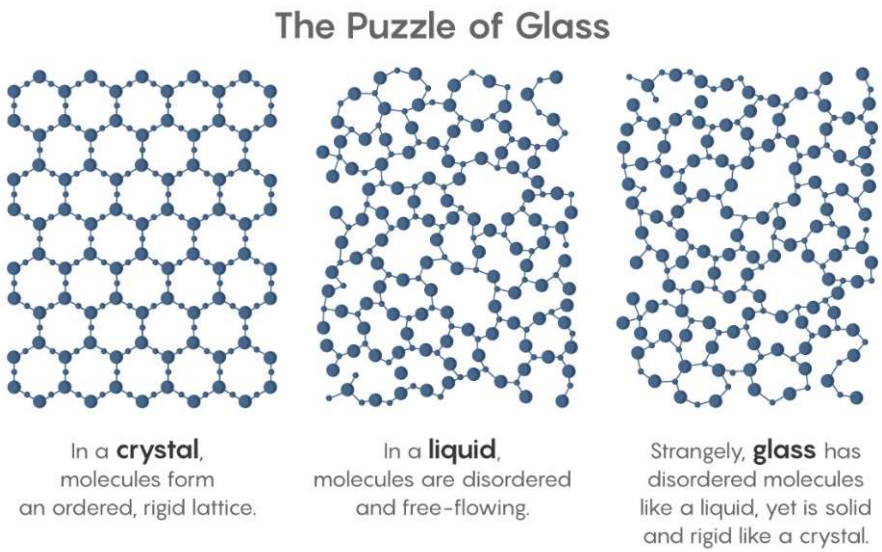
Differential Scanning Calorimetry (DSC)

Typical DSC curve for a glass.

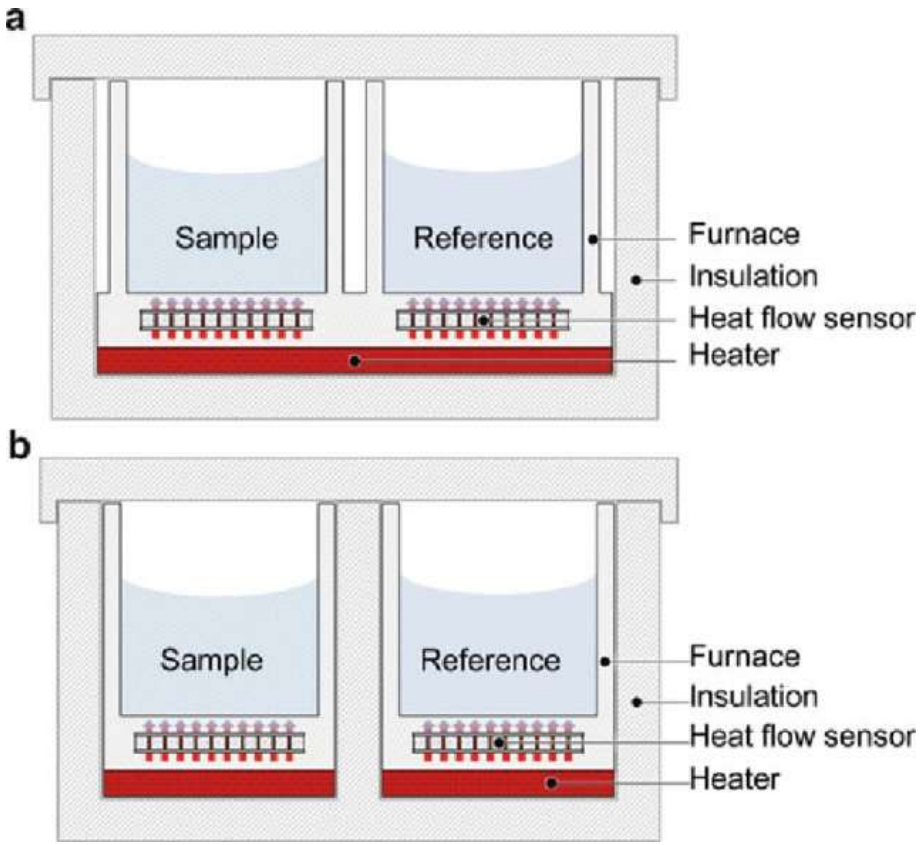




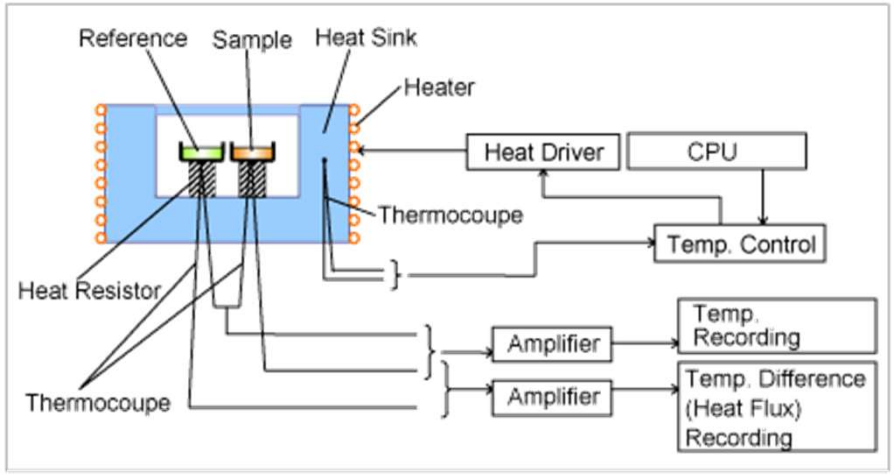
Differential Scanning Calorimetry (DSC)

Types of DSC calorimeters

(a) heat-flux calorimeter; (b) power compensation calorimeter.

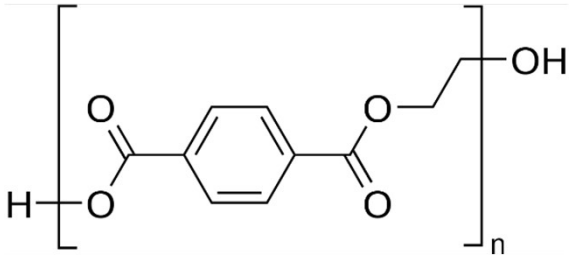


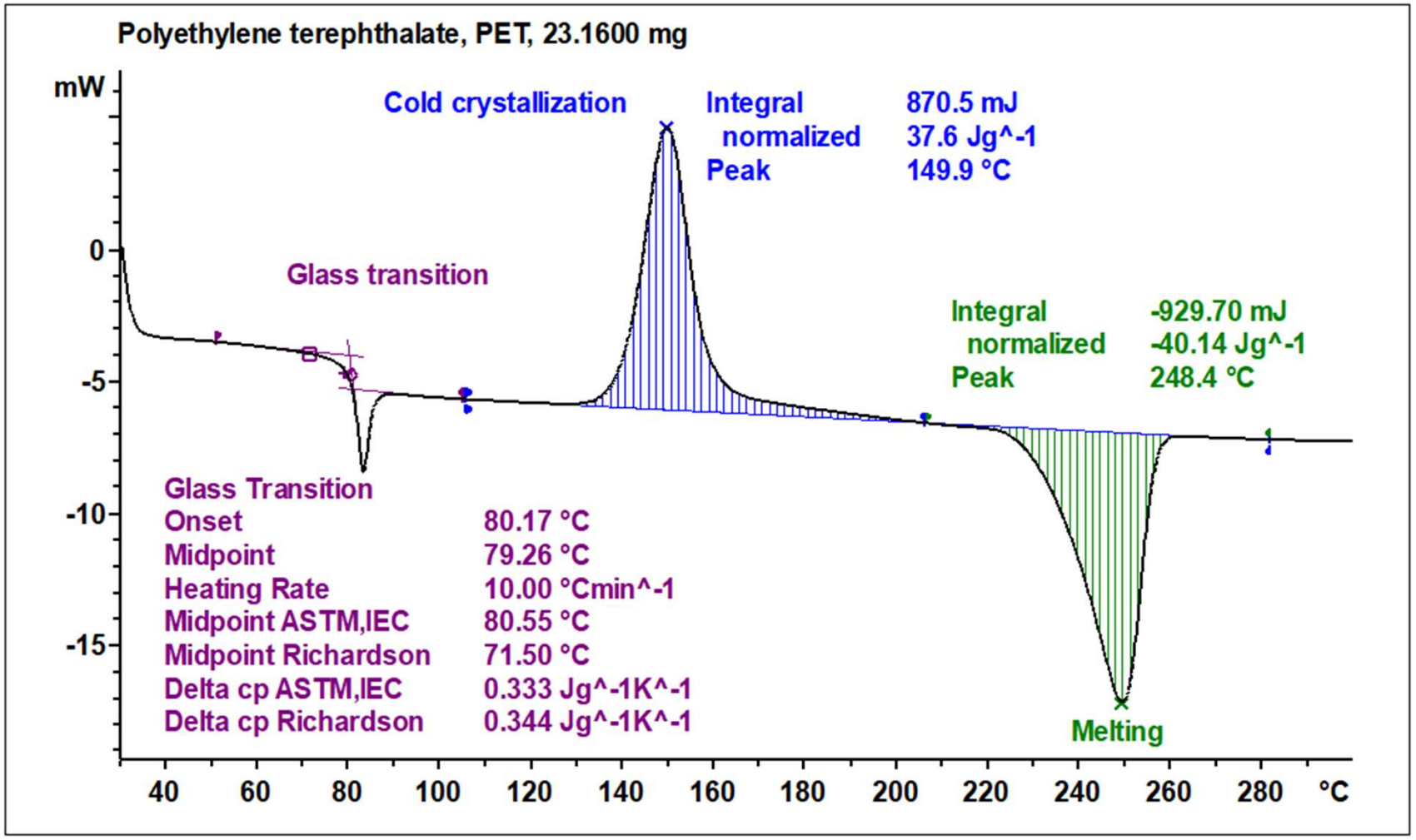
Description of DSC



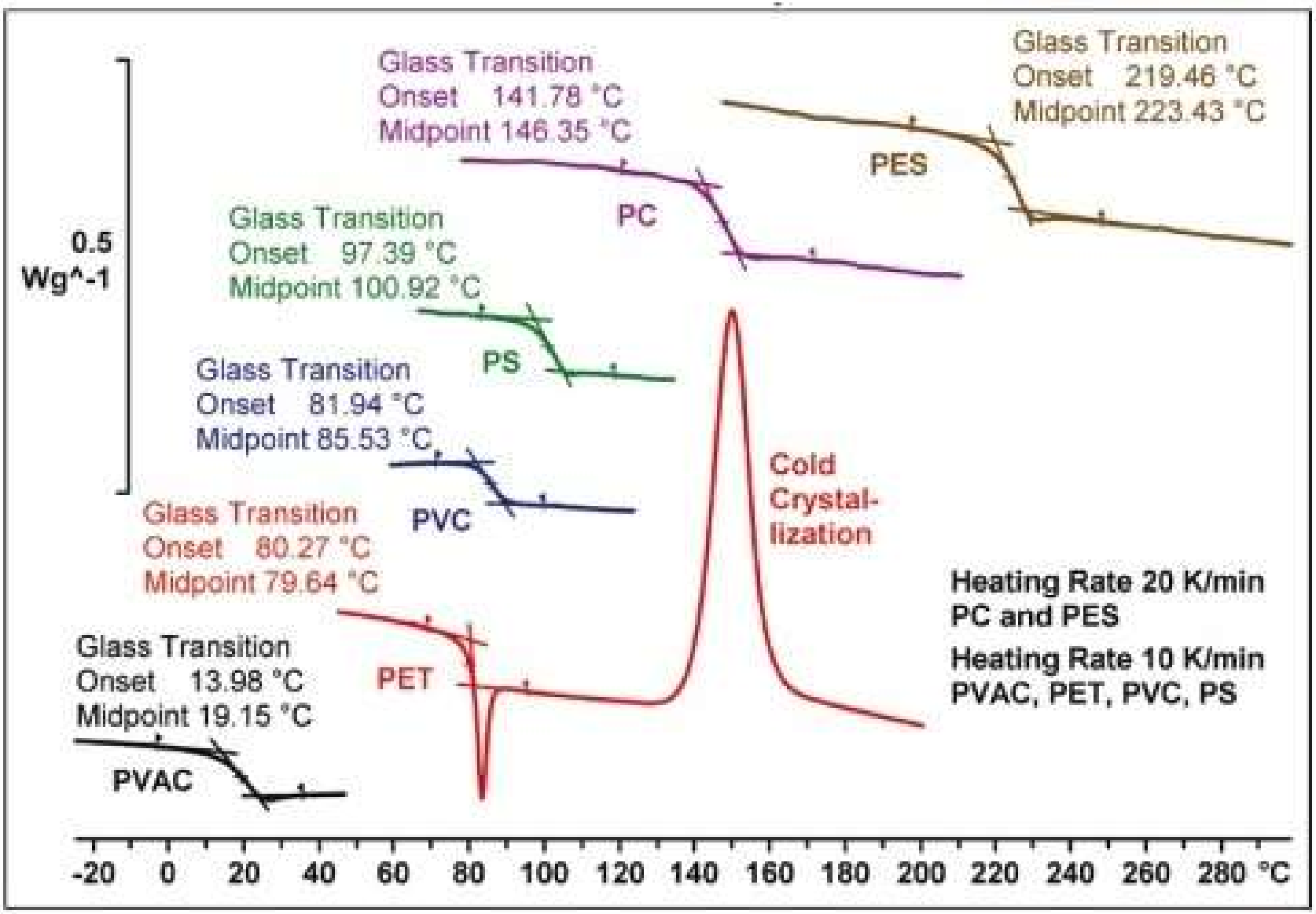
Polymers: DSC thermograms

Polyethylene terephthalate (or poly(ethylene terephthalate), **PET** or **PETE**, is the most common thermoplastic polymer resin of the polyester family!



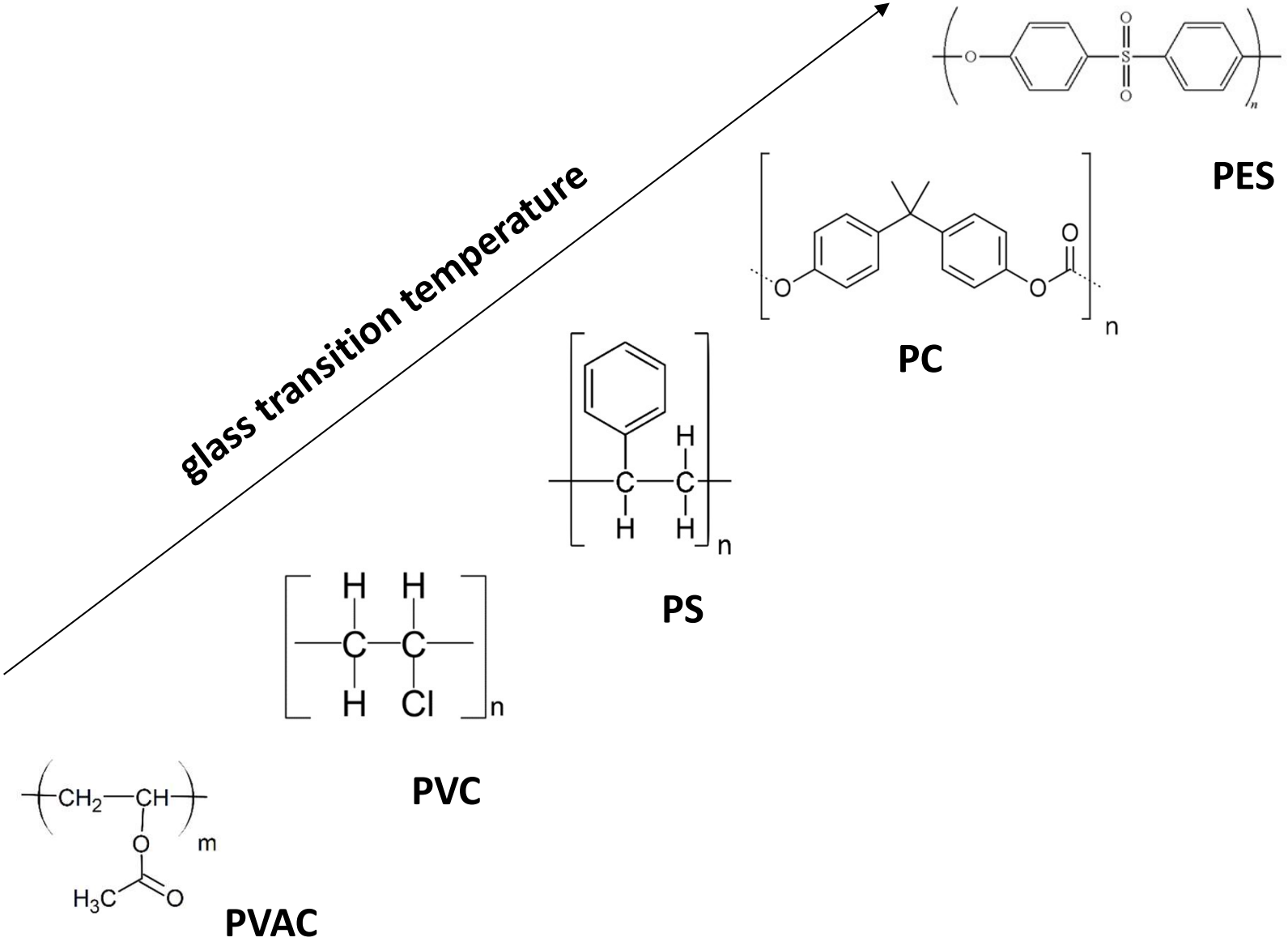


Polymers: glass transition

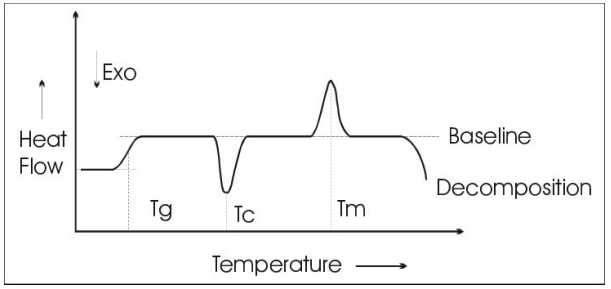


Glass Transition Temp. Measurements of Different Polymers Using DSC
(Source: Mettler-Toledo Analytical)

Polymers: glass transition



Polymers: glass transition



Polymer	Tg (°C)	Tm (°C)	ΔH_m (J/g)
PET	70 to 80	250 to 260	140
LDPE	<–100	100 to 110	140
PVC	80 to 84	-	-
PP	–30 to –20	160 to 165	207 to 209
PS	90 to 105	-	-
HDPE	<–100	125 to 135	293
ABS	–63 to 127	-	-
PC	145	-	-
PMMA	100 to 115	-	-
PA6	50 to 80	225 to 235	190 to 230
PA66	70 to 90	225 to 265	185
PA610	50 to 80	210 to 230	117 to 227
POM	–85 to –75	175 to 790	316 to 335
PBT	45 to 60	220 to 230	142

PET: $T_g/T_m = 0.66$

PA6: $T_g/T_m = 0.65$

PA66: $T_g/T_m = 0.69$

PA610: $T_g/T_m = 0.67$

PBT: $T_g/T_m = 0.65$

$$T_g/T_m \cong 2/3$$

T values in Kelvin

Case study: melting & glass transition

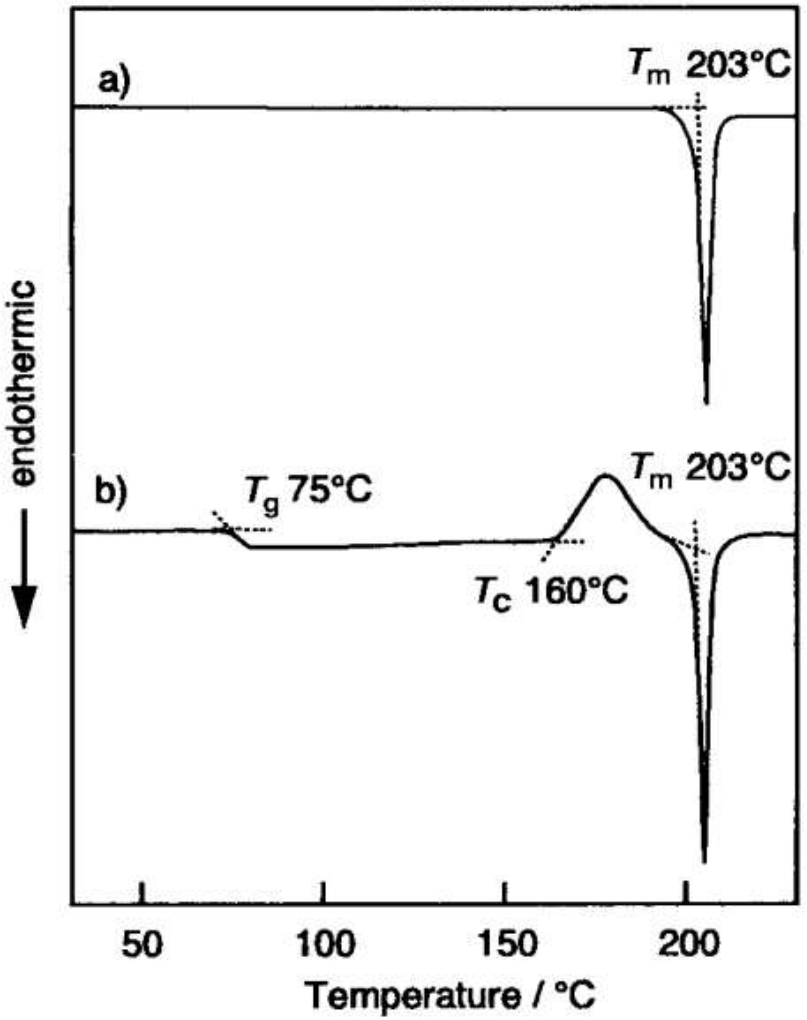


Fig. 1 DSC curves of *m*-MTDATA.

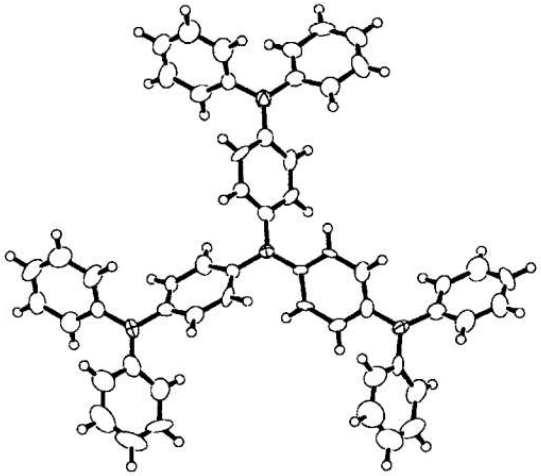
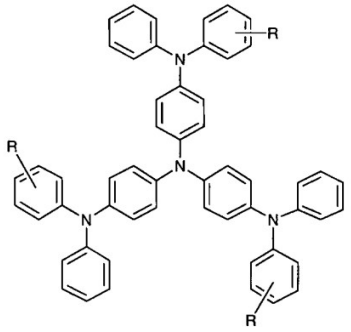


Fig. 2 Molecular structure of TDATA.



TDATA : R = H
***o*-MTDATA** : R = *o*-Me
***m*-MTDATA** : R = *m*-Me
***p*-MTDATA** : R = *p*-Me

J. Mater. Chem., 2000, **10**, 1–25

Case study: melting & glass transition

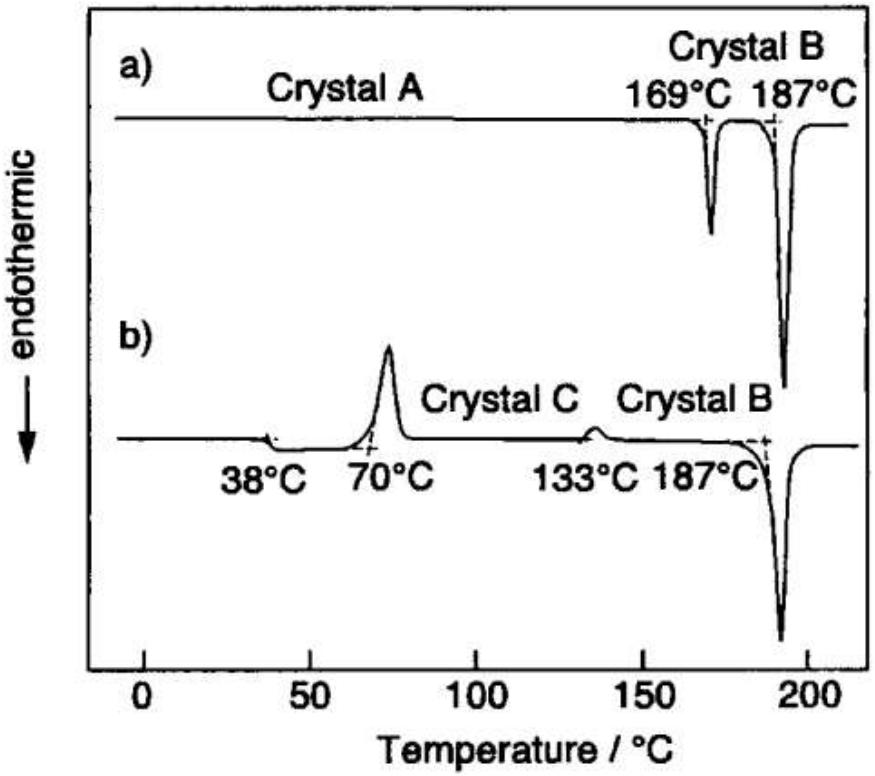
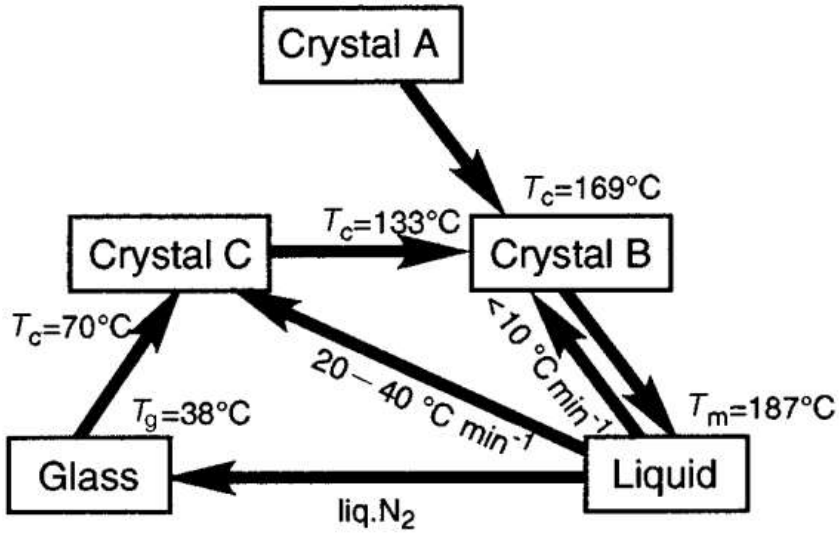
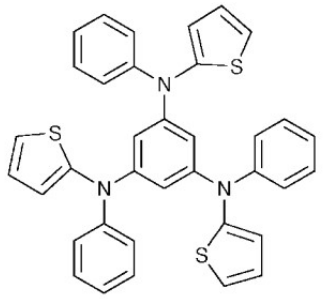


Fig. 4 DSC curves of α-TPTAB.



Scheme 1 Morphological changes of α-TPTAB.



α-TPTAB

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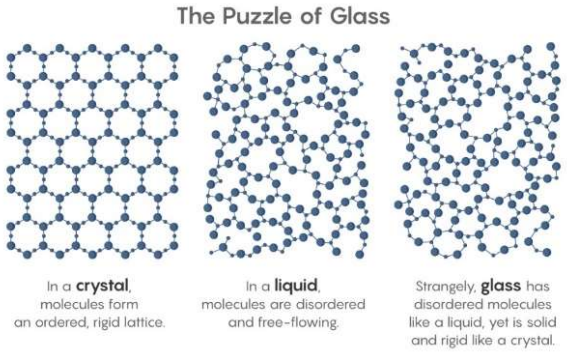

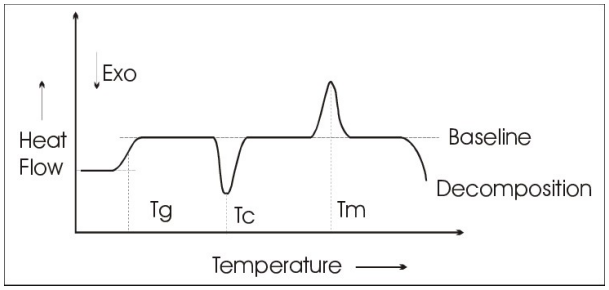

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