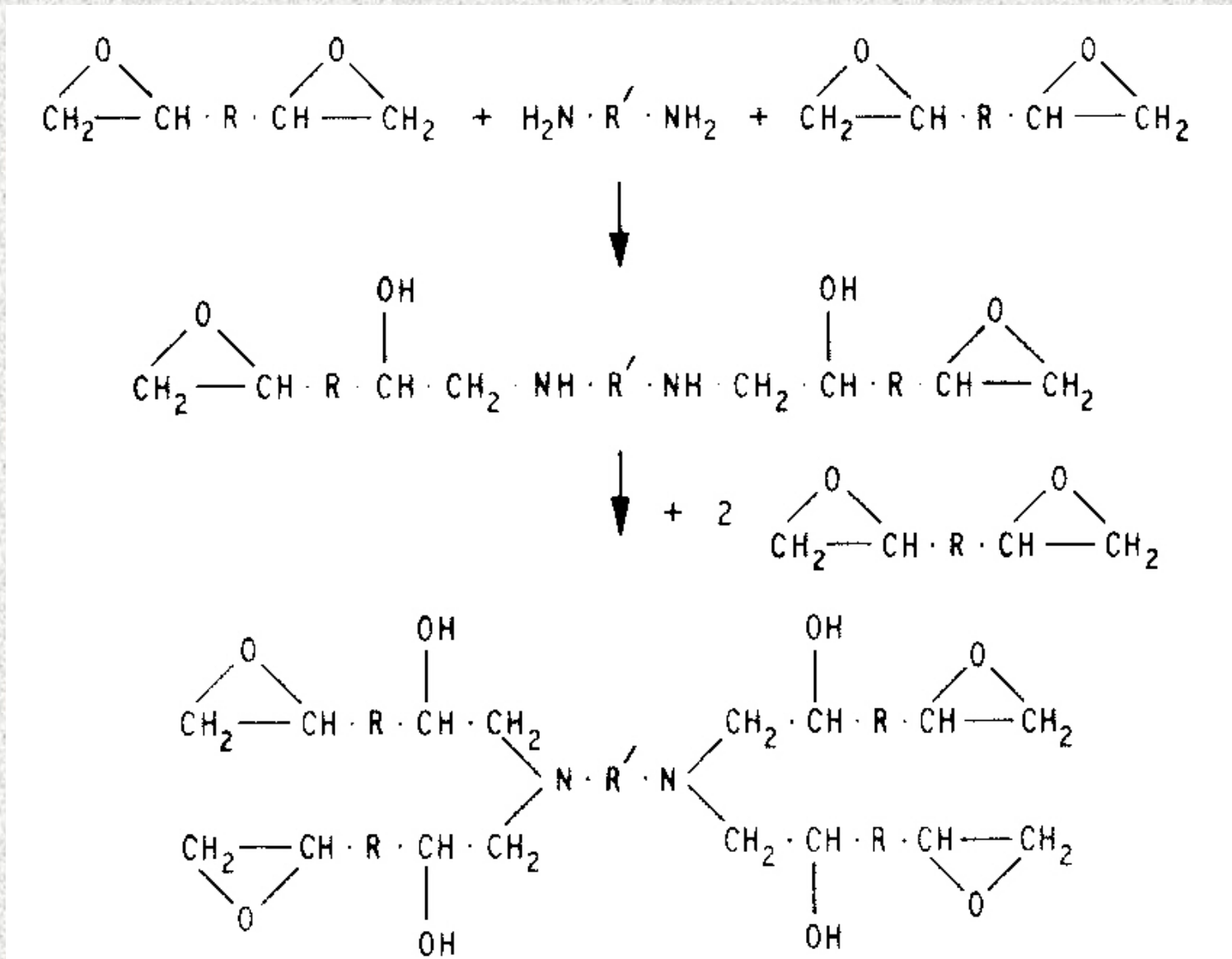


MIT/DMSE

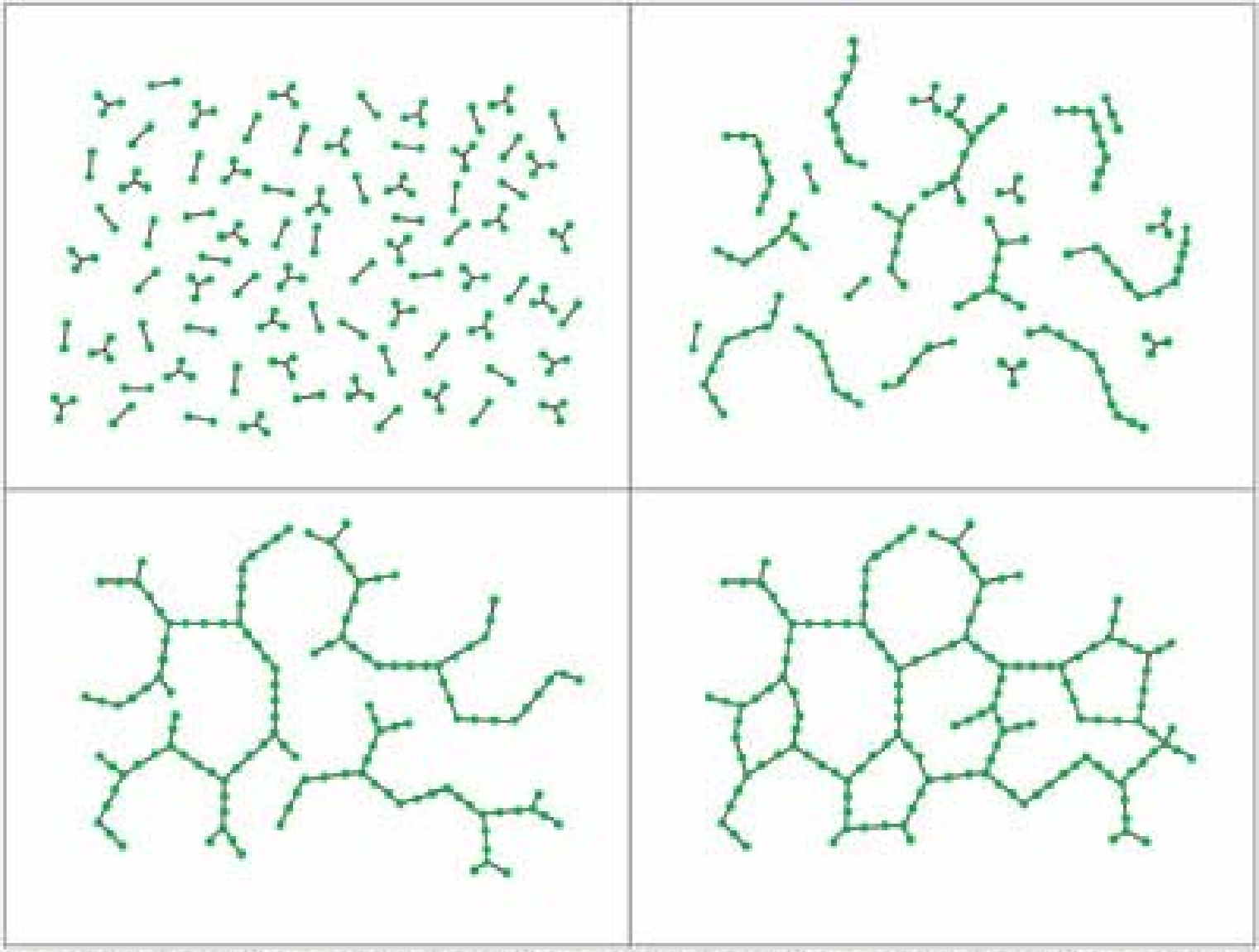


Figure by MIT OCW.

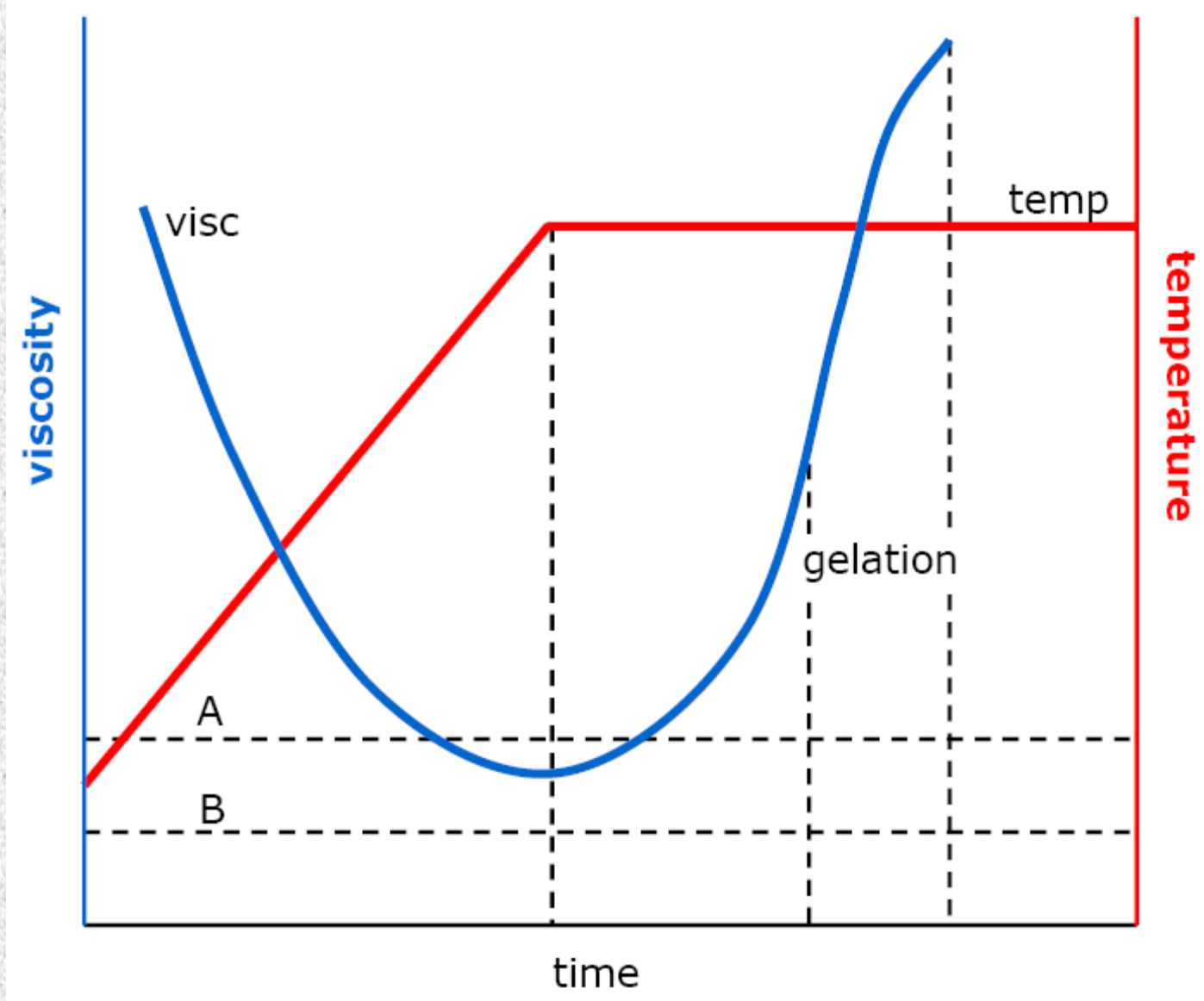


Figure by MIT OCW.

- Reaction kinetics

$$\frac{d\alpha}{dt} = k_0 \exp\left(\frac{-E^r}{R_g T}\right) \cdot \alpha^{m1} (1-\alpha)^{m2}$$

- Gelation

$$\alpha_{gel} = \frac{2}{f_{avg}}$$

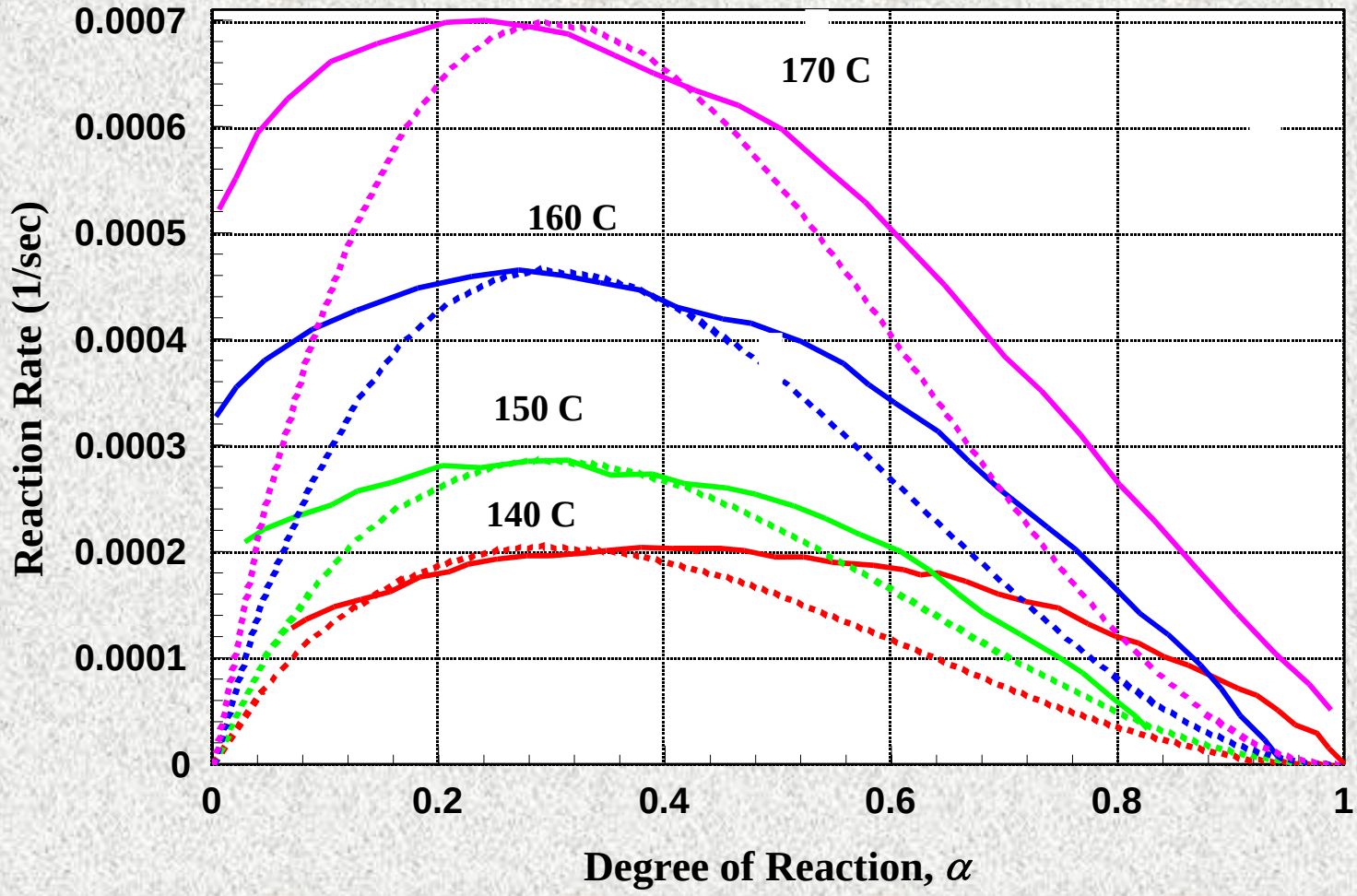
- "DiBenedetto" equation: variation of T_g with conversion

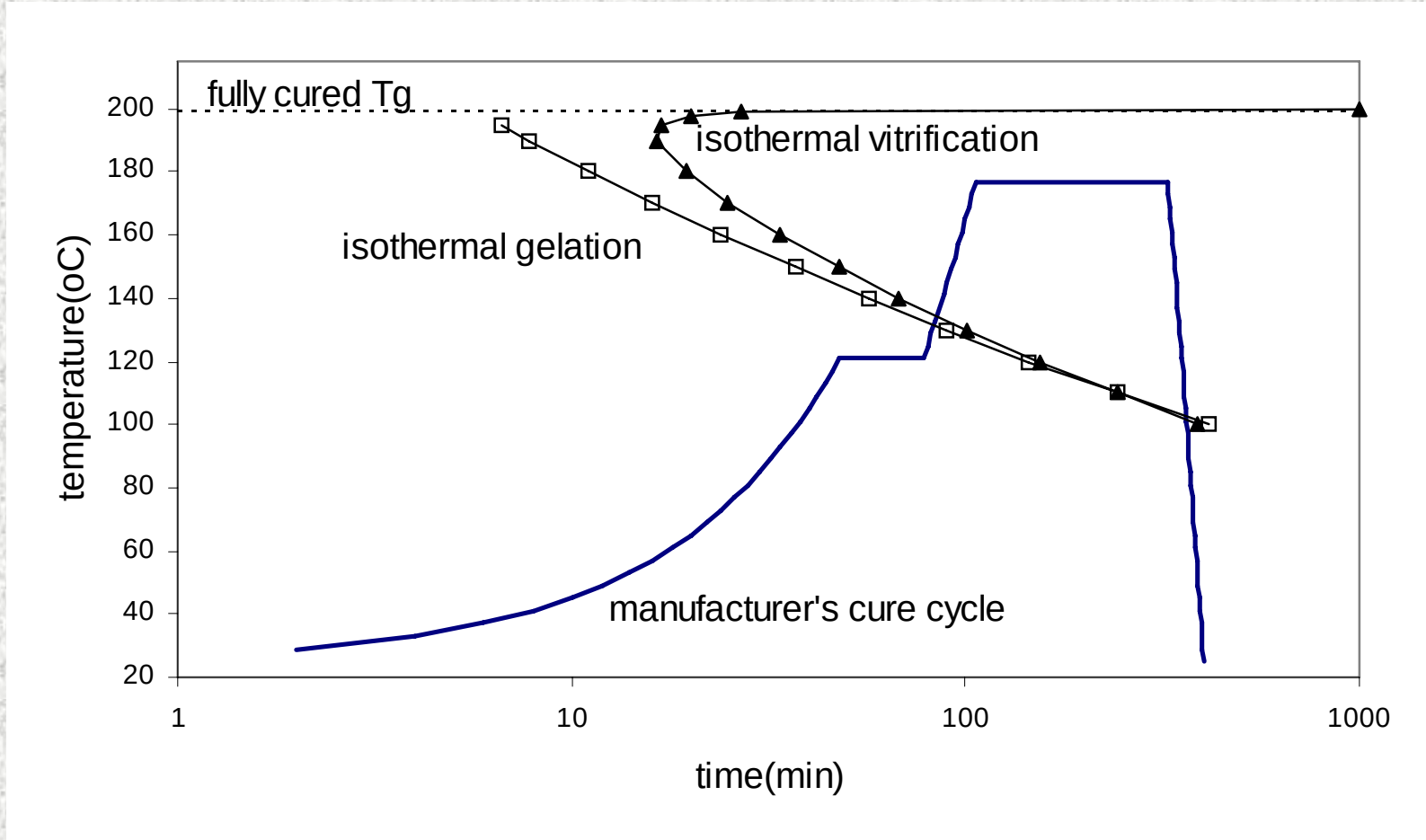
$$T_g = \frac{(1-\alpha)T_{g0} + \lambda\alpha T_{g\infty}}{(1-\alpha) + \lambda\alpha}$$

- Quenching of reaction below T_g

$$\ln k_0(T) = \ln k_0(T_g) + \frac{40.7(T - T_g)}{51.6 + (T - T_g)}$$

DSC Cure Scans and Model Fit




fully cured Tg
isothermal vitrification
isothermal gelation
manufacturer's cure cycle
temperature(oC)
200
180
160
140
120
100
80
60
40
20
1
10
100
1000
time(min)