

PTL705 POLYMER CHARACTERIZATION PART A

Max: 30 points Time: 10:30 am-12:30 pm Date: 24-11-2008

1. Draw TGA curves for polymer samples which decompose in a multistage process but with and without stable intermediates. Suggest two possible means to potentially resolve different stages of thermal degradation for a sample with no apparent stable intermediates. 4 points

2. Distinguish between DSC and DTA? Draw a typical DSC response curve. 4 points

3. Explain how ΔH values are obtained from DSC measurements? 2 points

4. Deduce the structure of the following compounds from the data given: $4 \times 4 = 16$ points

a) Molecular Formula: $C_6H_6O_3$

1H NMR: δ 2.05 (s, 6H) ^{13}C NMR: δ 166, 141, 13

b) Molecular Formula: $C_9H_{12}BrN$

1H NMR: δ 7.3 (t, 1H) 7.15 (d, 1H) 7.05 (s, 1H) 6.98 (d, 1H) 3.02 (q, 2H) 2.84 (s, 3H) 1.30 (t, 3H)

c) Molecular Formula: $C_{12}H_{13}NSi$

1H NMR: δ 7.4 (d, 2H, $J=8Hz$) 7.2 (d, 2H, $J=8Hz$) 0.2 (s, 9H)

d) Molecular Formula: $C_4H_6O_2$

IR: 3025, 2982, 2950, 1765, 1642 cm^{-1}

^{13}C NMR: δ 168, 142, 98, 22

5. The 1H and ^{13}C NMR spectra of a compound with the molecular formula $C_5H_8O_3$ is shown below. Deduce its structure 4 points

