

MSE250 - Homework 9 Textbook Questions (8th ed.)

14.19 (a) Determine the ratio of butadiene to styrene repeat units in a copolymer having a number-average molecular weight of 350,000 g/mol and degree of polymerization of 4425.

(b) Which type(s) of copolymer(s) will this copolymer be, considering the following possibilities: random, alternating, graft, and block? Why?

15.7 In Figure 15.28, the logarithm of $E_r(t)$ versus the logarithm of time is plotted for polyisobutylene at a variety of temperatures. Make a plot of $E_r(10)$ versus temperature and then estimate its T_g .

15.15 Briefly explain how each of the following influences the tensile or yield strength of a semicrystalline polymer and why:

- Molecular weight
- Degree of crystallinity
- Deformation by drawing
- Annealing of an undeformed material

15.22 For each of the following pairs of polymers, plot and label schematic stress-strain curves on the same graph [i.e., make separate plots for parts (a), (b), and (c)].

(a) Isotactic and linear polypropylene having a weight-average molecular weight of 120,000 g/mol; atactic and linear polypropylene having a weight-average molecular weight of 100,000 g/mol

(b) Branched poly(vinyl chloride) having a degree of polymerization of 2000; heavily crosslinked poly(vinyl chloride) having a degree of polymerization of 2000

(c) Poly(styrene-butadiene) random copolymer having a number-average molecular weight of 100,000 g/mol and 10% of the available sites crosslinked and tested at 20°C; poly(styrene-butadiene) random copolymer having a number-average molecular weight of 120,000 g/mol and 15% of the available sites crosslinked and tested at -85°C. Hint: poly(styrene-butadiene) copolymers may exhibit elastomeric behavior.

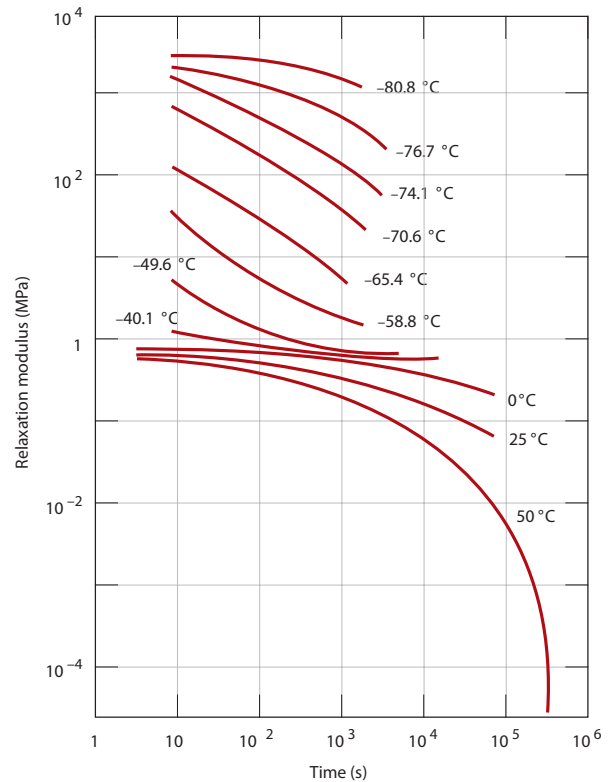


Figure 15.28 Logarithm of relaxation modulus versus logarithm of time for polyisobutylene between -80 and 50°C. (Adapted from E. Catsiff and A. V. Tobolsky, "Stress-Relaxation of Polyisobutylene in the Transition Region [1,2]," *J. Colloid Sci.*, 10, 377 [1955]. Reprinted by permission of Academic Press, Inc.)