Molecular Weight

14.2 Repeat unit weights for several polymers are asked for in this problem.

(a) For polytetrafluoroethylene, each repeat unit consists of two carbons and four fluorines (Table 14.3). If A_C and A_F represent the atomic weights of carbon and fluorine, respectively, then

$$m = 2(A_C) + 4(A_F)$$

$$= (2)(12.01 \text{ g/mol}) + (4)(19.00 \text{ g/mol}) = 100.02 \text{ g/mol}$$

(b) For poly(methyl methacrylate), from Table 14.3, each repeat unit has five carbons, eight hydrogens, and two oxygens. Thus,

$$m = 5(A_C) + 8(A_H) + 2(A_O)$$

$$= (5)(12.01 \text{ g/mol}) + (8)(1.008 \text{ g/mol}) + (2)(16.00 \text{ g/mol}) = 100.11 \text{ g/mol}$$

(c) For nylon 6,6, from Table 14.3, each repeat unit has twelve carbons, twenty-two hydrogens, two nitrogens, and two oxygens. Thus,

$$m = 12(A_C) + 22(A_H) + 2(A_N) + 2(A_O)$$

$$= (12)(12.01 \text{ g/mol}) + (22)(1.008 \text{ g/mol}) + (2)(14.01 \text{ g/mol}) + (2)(16.00 \text{ g/mol})$$

$$= 226.32 \text{ g/mol}$$

(d) For poly(ethylene terephthalate), from Table 14.3, each repeat unit has ten carbons, eight hydrogens, and four oxygens. Thus,

$$m = 10(A_C) + 8(A_H) + 4(A_O)$$

$$= (10)(12.01 \text{ g/mol}) + (8)(1.008 \text{ g/mol}) + (4)(16.00 \text{ g/mol}) = 192.16 \text{ g/mol}$$