

14.5 (a) From the tabulated data, we are asked to compute  $\overline{M}_n$ , the number-average molecular weight. This is carried out below.

Molecular wt Range	Mean $M_i$	$x_i$	$x_i M_i$
10,000-20,000	15,000	0.03	450
20,000-30,000	25,000	0.09	2250
30,000-40,000	35,000	0.15	5250
40,000-50,000	45,000	0.25	11,250
50,000-60,000	55,000	0.22	12,100
60,000-70,000	65,000	0.14	9100
70,000-80,000	75,000	0.08	6000
80,000-90,000	85,000	0.04	3400

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$$\overline{M}_n = \sum x_i M_i = 49,800 \text{ g/mol}$$

(b) From the tabulated data, we are asked to compute  $\overline{M}_w$ , the weight-average molecular weight.

Molecular wt. Range	Mean $M_i$	$w_i$	$w_i M_i$
10,000-20,000	15,000	0.01	150
20,000-30,000	25,000	0.04	1000
30,000-40,000	35,000	0.11	3850
40,000-50,000	45,000	0.23	10,350
50,000-60,000	55,000	0.24	13,200
60,000-70,000	65,000	0.18	11,700
70,000-80,000	75,000	0.12	9000
80,000-90,000	85,000	0.07	5950

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$$\overline{M}_w = \sum w_i M_i = 55,200 \text{ g/mol}$$

(c) Now we are asked to compute the degree of polymerization, which is possible using Equation 14.6. For polytetrafluoroethylene, the repeat unit molecular weight is just