Polymer chemistry and macromolecular engineering

Fall 2024

Exercise 1-Solutions

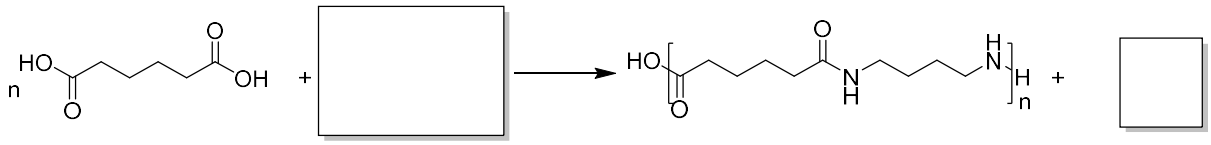
1. What is the difference between homopolymers and copolymers and draw a simplified representation for each of them?

2. What is the difference between a condensation and an addition polymer?

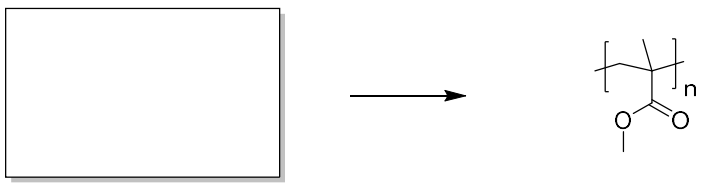
3. List 3 examples of polymers from everyday life and write their chemical structures.

4. Complete the following reaction schemes and indicate (i) whether the polymers are addition or condensation polymers and (ii) whether the reactions are step or chain polymerizations.

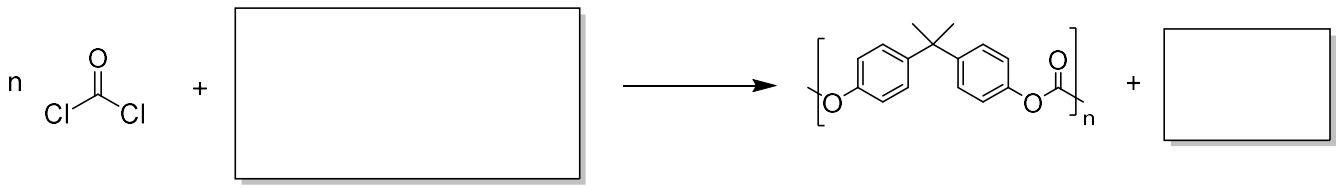
a)



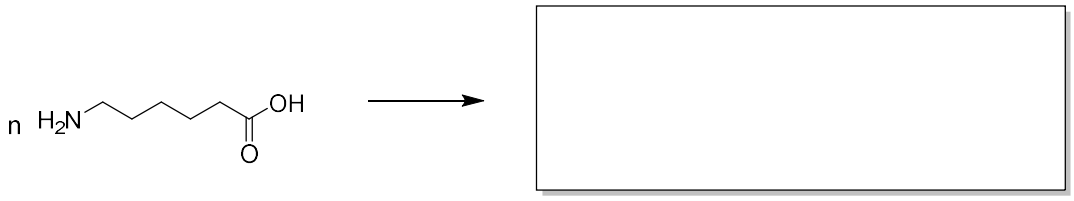
b)



c)



d)



5. The weight fraction and molar masses for a synthesized polymer are given in the table below. Suppose the polymer is a homopolymer and is polydispersed. From the given data, please calculate:

1) Number-average (Mn) molecular weight

2) Weight-average (Mw) molecular weight

3) Viscosity-average (Mv) molecular weight (assume a = 0.5).

4) Dispersity Đ of the polymer

5) Show the distribution of molecular weights in typical polymer sample.

Fraction	Weight fraction	Mi (g/mol)
1	0.1	350 000
2	0.15	220 000
3	0.2	150 000
4	0.25	80 000
5	0.18	60 000
6	0.12	35 000