

080426 Quiz 3 Polymer Properties

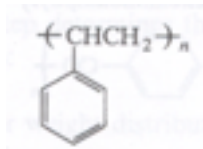
We discussed the two main mechanisms for polymerization and a list of polymers and their structure this week.

- 1) Consider a mind experiment where you pop corn, but each time a corn kernel pops it joins with another kernel or with another chain of kernels.
 - a) How would you expect the average number of kernels in a chain to change with time in such a situation? What would be the effect of old maids (unpopped kernels) on the average number of kernels in a chain? What happens if there are no old maids?
 - b) Which of the two main mechanisms for polymerization does this popping resemble?
 - c) Give an example of a polymer that is polymerized by this mechanism.

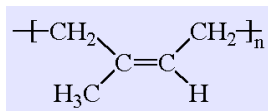
- 2) Draw the structure or give the name of the following polymers and indicate which of the two types of polymerization could be responsible for this polymer. Indicate, where appropriate, the polyester, polyamide or polyurethane linkages.

- a) polyethylene terephthalate

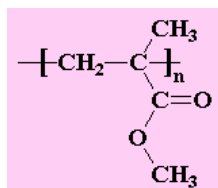
b)



c)



d)

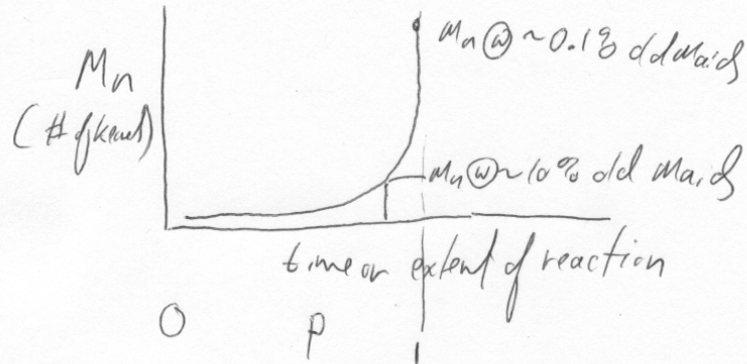


- e) Poly vinyl alcohol

- 3) Polyethylene and polypropylene are the two most prevalent polymers due to their low cost and ease of synthesis.
 - a) List the 4 types of polyethylene that are commonly used in industry.
 - b) What is the difference in chain structure between these types?
 - c) What two types of polypropylene are commonly seen in industry and what is the difference in chain structure for these two types?

ANSWERS: 080426 Quiz 3 Polymer Properties

1) a)

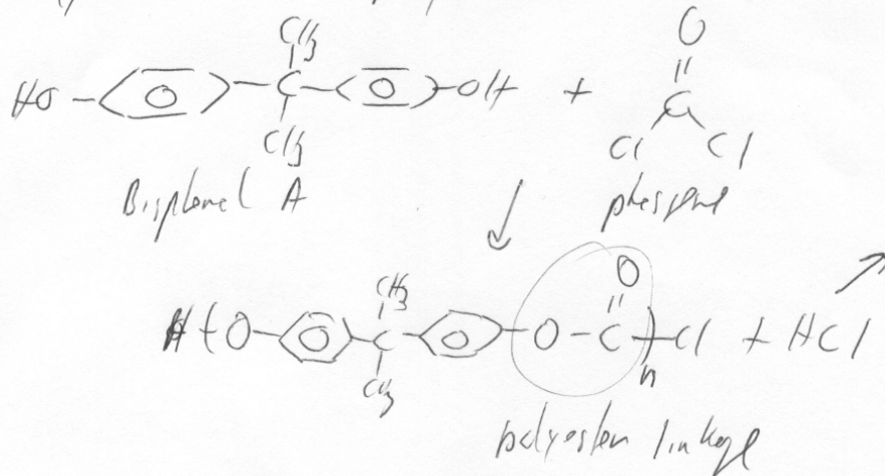


A few old monomers makes the $\langle M_n \rangle$ much lower because the slope is steep at the end of polymerization.

with no old monomers the entire system, some chain.

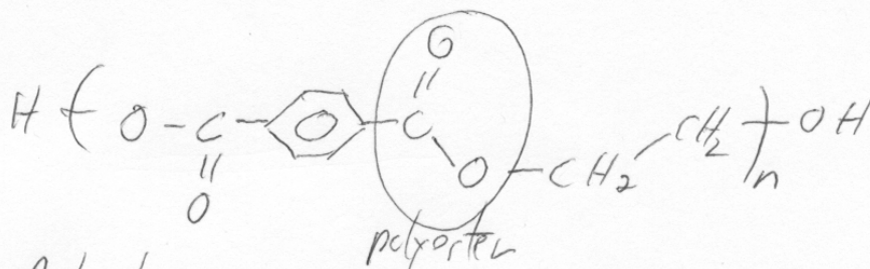
b) Step growth polymerization

c) Polyester like polycarbonate



②

2) a) PET is a polyester made by step growth

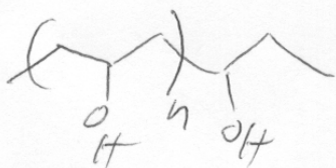


b) Polystyrene is a vinyl polymer made by chain growth

c) Polyisoprene is a diene polymer made by chain growth

d) Polymethylmethacrylate is an acrylic made by chain growth

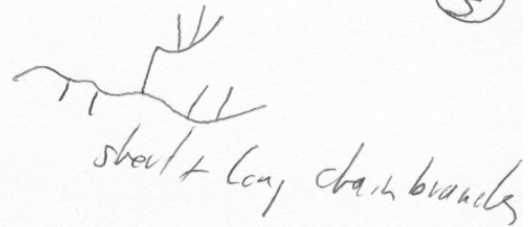
e)



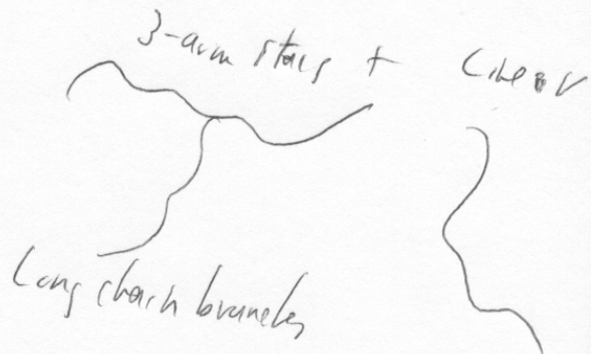
a vinyl polymer
made by chain growth

3

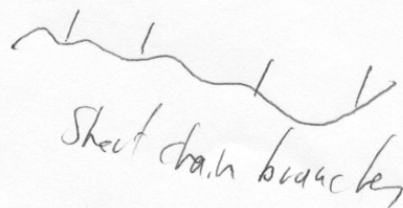
3) a) LDPE Low density
b)



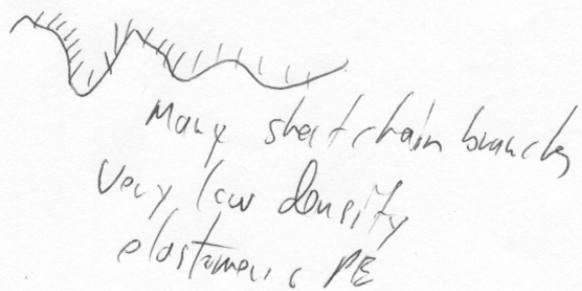
HDPE High density



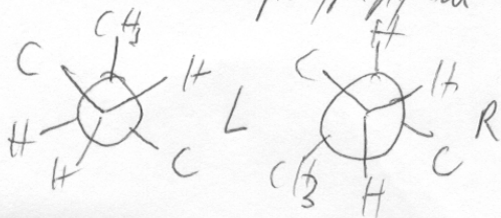
LLDPE Linear Low Density
Polyethylene



Metallocene PE



c) isotactic polypropylene
syndiotactic polypropylene



ZN catalyst
metallocene catalyst
isotactic = LLL or RRR triads
syndiotactic = LRL or RLR triads