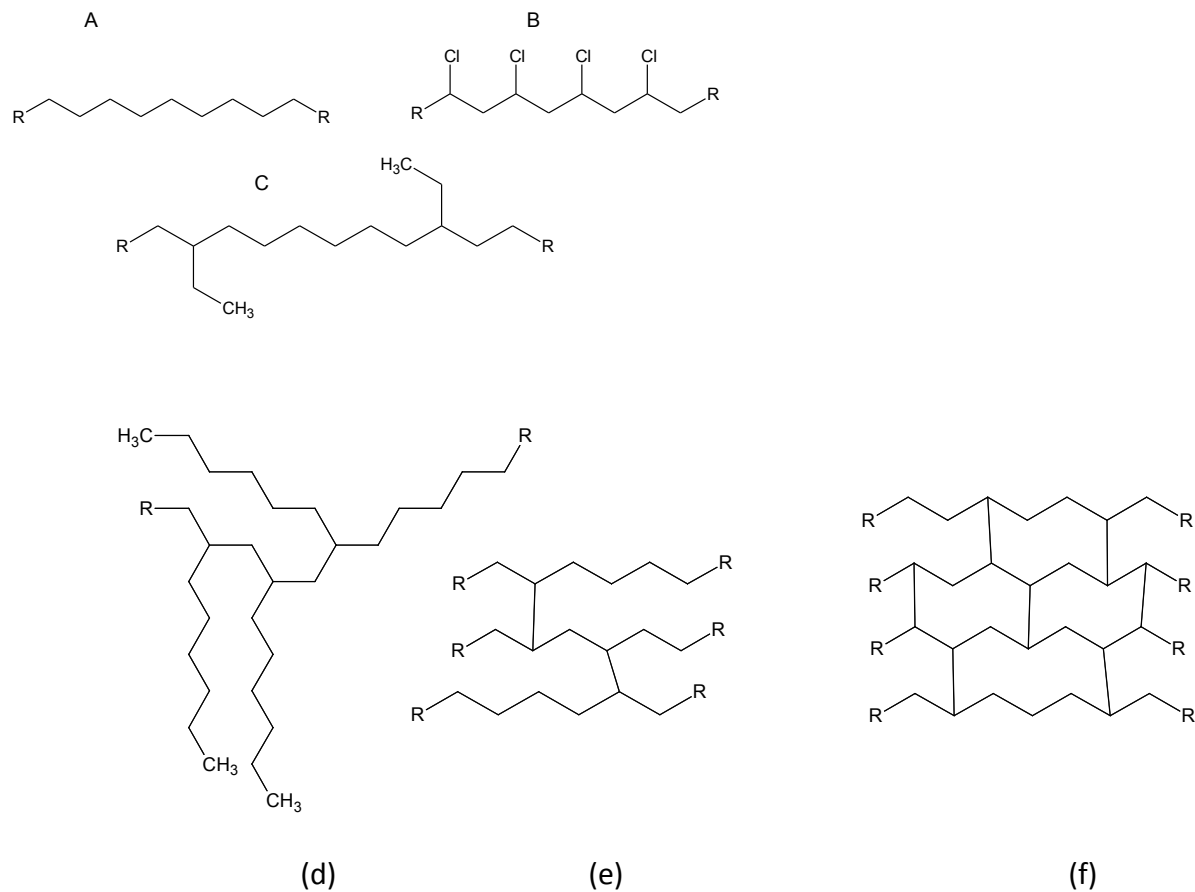


## Chapter 2: Polymer Structure (Morphology)

1.



2. (a) LDPE, (b) LDPE.

3. (a) about 109.5; (b) about 109.5 ; zigzag chains characteristic of alkanes

4. Contour length are both about the same since the backbone for each is composed entirely of carbon atoms. Given a C-C bond length of 0.126 nm this means the effective length for each unit is  $2 \times 0.126 \text{ nm} = 0.252 \text{ nm}$ . Thus the contour length is  $0.252 \text{ nm}$  times 2000 units = 504 nm.

5. d,g,i.

6. 1,000

7. (a)  $-\text{CH}_2-\text{CH}(\text{CH}_3)-$ , (b)  $-\text{CH}_2-\text{CHCl}-$ , (c)  $-\text{CH}_2-\text{CH}(\text{CH}_3)=\text{CH}-\text{CH}_2-$

8. c.

9. d,e,f,g.

10. a.

11. In truth either answer can be defended. Because of the branching present in LDPE, configurational changes, it causes a tendency for the resulting LDPE to be more amorphous, conformational changes, in comparison to HDPE, which has fewer branch points and a greater tendency to form linear, more crystalline, structures.

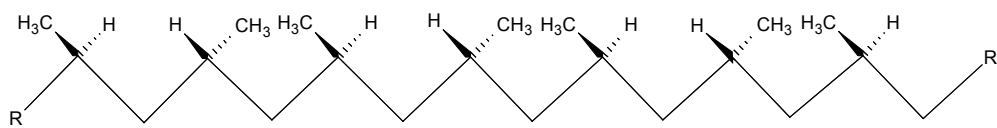
12. a.

13. a.

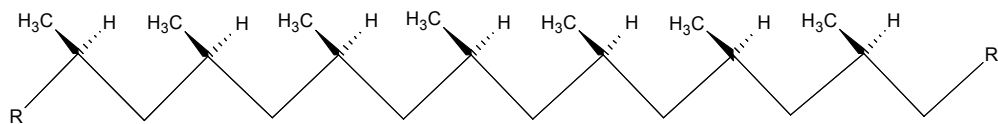
14. (a)  $-\text{CH}_2-\text{CH}(\text{OH})-\text{CH}_2-\text{CH}(\text{OH})-$ , (b)  $-\text{CH}_2-\text{CH}(\text{OH})-\text{CH}(\text{OH})-\text{CH}_2-$

15.

(a) syndiotactic-polypropylene or simply sPP.



(b) isotactic-polypropylene or simply iPP.



16. See Figure 2.7; simply extend the end methyl groups making them methylene groups.
17. (a) HDPE, LDPE, hevea rubber, etc., (b) PVC, etc., (c) nylon-66, cellulose, silk, etc.
18. b.
19. a.
20. a.
21. b.
22. Low or no flow; slow cooling rate; linear polymers.
23. 378 nm
24. a.
25. (a) because of a more regular structure.
26. b.
27. Intramolecular hydrogen bonds.
28. a.
29. Being transparent depends of having a homogeneous structure so (a) is the least homogeneous and thus has varying refractive indexes causing it to appear hazy.
30. a
31. a and c.
32. a.
33. b.
34. Vacant space and sufficient energy.
35. Chemical (formation of primary bonds) and physical (chain entanglement and crystalline formation).