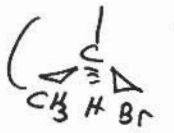
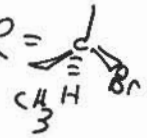
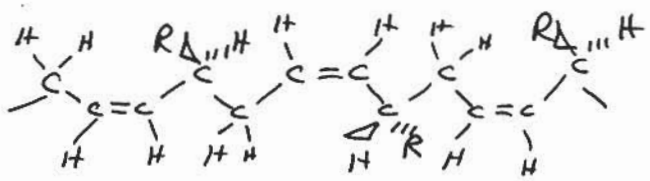
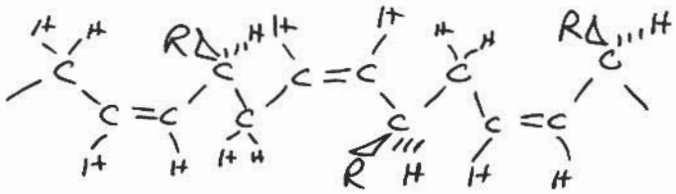
3.034 quiz #1 solution

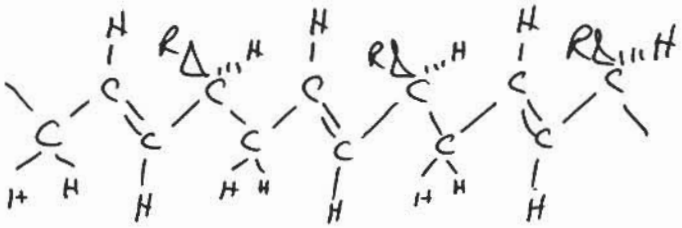
(a) On this case, all 4 isomers would be optically active since the sidegroup () is optically active } Let R = 



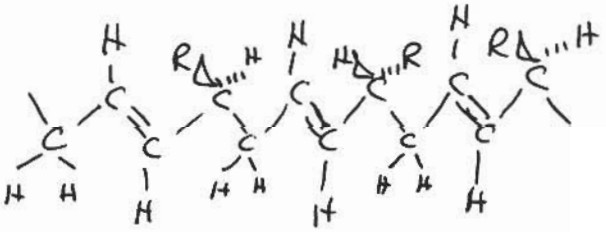
cis - isotactic



cis - Syndiotactic

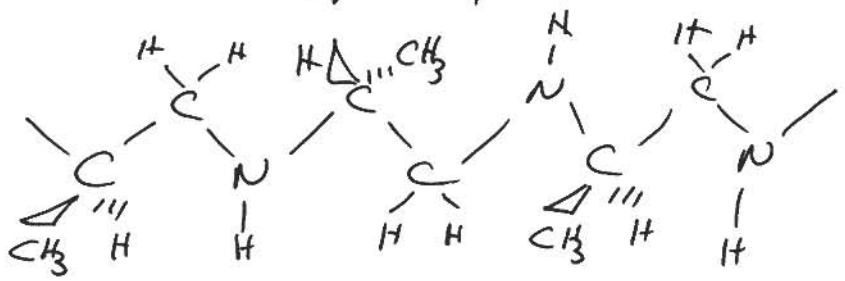


trans - isotactic

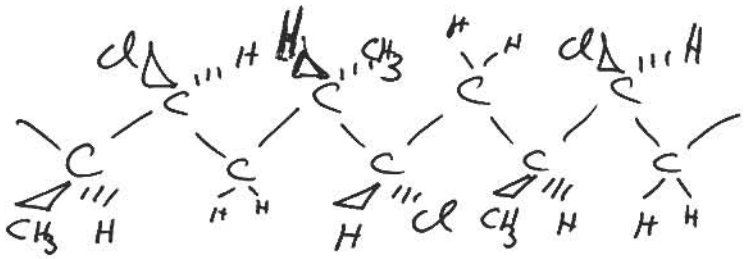


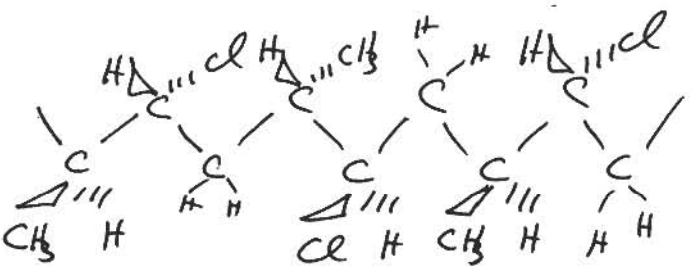
trans - Syndiotactic

(1b) In this case, only the isotactic isomer is optically active. (2)



(1c) In this case, we have 2 different di-isotactic isomers that are optically active





$$\bar{M}_n = \sum n_{f_i} M_i \Big\} n_{f_i} = \frac{n_i}{\sum n_i}$$

$$\bar{M}_w = \sum w_{f_i} M_i \Big\} w_{f_i} = \frac{n_i M_i}{\sum n_i M_i}$$

$M_1 = 50k$ $\quad n_1 = 1$ mole $\quad n_{f_1} = 0.5$

$M_2 = 150k$ $\quad n_2 = 1$ mole $\quad n_{f_2} = 0.5$

$$\bar{M}_n = (0.5)(50k) + (0.5)(150k)$$

$$\boxed{\bar{M}_n = 100{,}000 \text{ g/mole}}$$

$$w_{f_1} = \frac{50k}{200k} = 0.25$$

$$w_{f_2} = \frac{150k}{200k} = 0.75$$

$$\bar{M}_w = (0.25)(50k) + (0.75)(150k)$$

$$\boxed{= 125{,}000 \text{ g/mole}}$$

$$PDI = \frac{\bar{M}_w}{\bar{M}_n} = 1.25$$