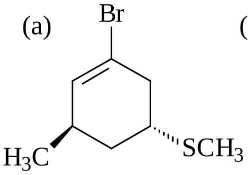
FIANL EXAMINATION, 59-135, 1993

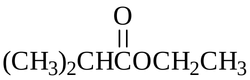
1.

(a)



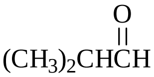
(b) H_2O/H^+

(c)



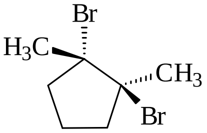
$(CH_3)_2CH\overset{\overset{O}{\|}}{C}OCH_2CH_3$ + CH_3OH (H^+ cat)

(d)



$(CH_3)_2CH\overset{\overset{O}{\|}}{C}H$

(e)



(f) O_3 then Zn

(g) $(CH_3)_2CHCH_2C\equiv C-CH_3$

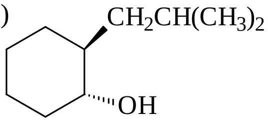
(h) CrO_3/pyridine

(i) $HOCH_2CH_2OH$ (H^+ cat)

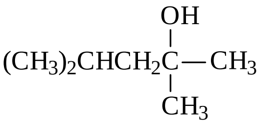
(j)

$CH_3\overset{Br}{C}HCH_2CH_2\overset{\overset{O}{\|}}{C}-Cl$

(k)



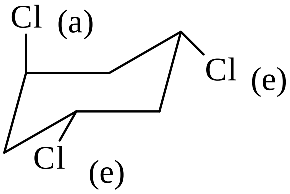
(l)



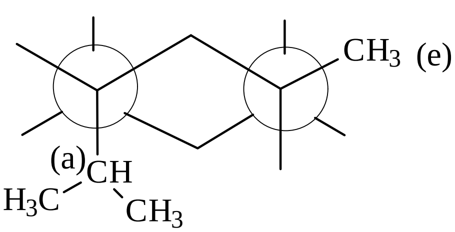
$(CH_3)_2CHCH_2\underset{CH_3}{\overset{OH}{C}}-CH_3$

2.

(a)



(b)



(c) (i) identical; (ii) diastereomers; (iii) diastereomers;

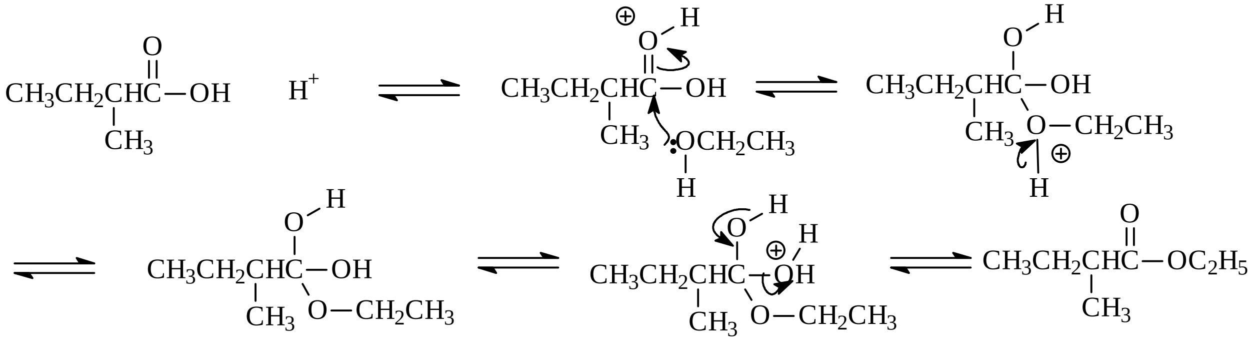
(d) top carbon priorities Cl > chain > CH_3 > H Config = <u>S</u>
middle carbon priorities Br > top > bottom > H Config = <u>S</u>
bottom carbon priorities OH > chain > COOH > H Config = <u>R</u>

(e) The product is a racemic mixture. Attack of the Br_2 from the top give the mirror image (enantiomer) of the molecule produced by attack of the Br_2 from the bottom.

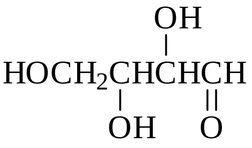
(f) The product is a mixture of FOUR stereoisomers. These are the RR, SS, RS and SR isomers.

These are two pairs of enantiomers.

3\.



4\. Both A and B are aldehydes and have on other unsaturation. The other three oxygen atoms must be alcohols or ethers. The fact that they all react with acetic anhydride to form esters tells you that they are all alcohols. Possible structure is



$HOCH_2\underset{OH}{\underset{\mid}{CH}}\overset{OH}{\overset{\mid}{C}}H\underset{O}{\underset{\|}{C}}H$

If both A and B have the same sign of rotation, they cannot be enantiomers and therefore must be either diastereomers or positional isomers. The latter is impossible since a molecule with two OH groups on the same carbon is unstable.

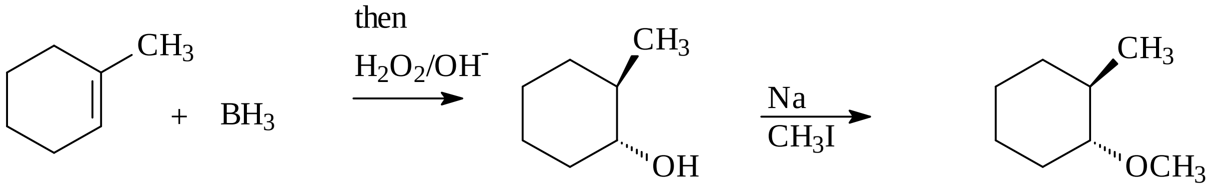
5\. (a) $HO_2C(CH_2)_4COOH$ and $H_2N(CH_2)_6NH_2$

(b) an amide bond is used. This is the same bond that holds amino acids together into proteins

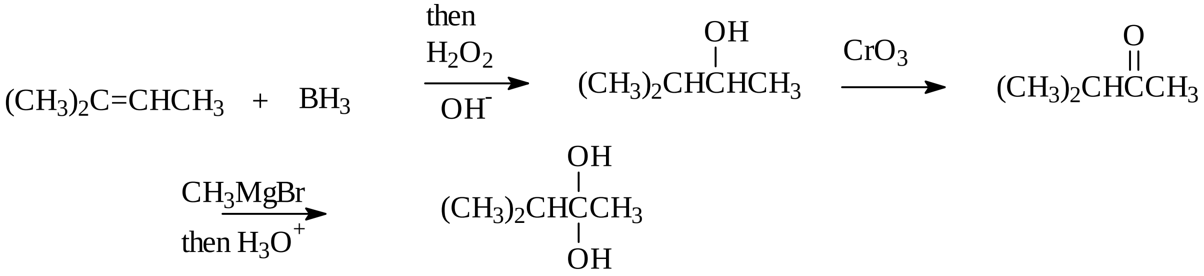
(c) Amides are slower than esters to hydrolyze in base [refer to the mechanisms!]. Therefore nylon should be more stable to base than polyesters.

6\.

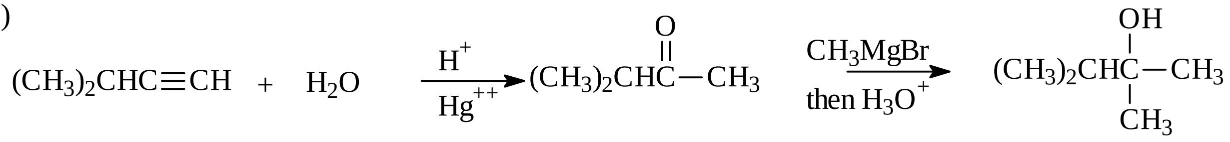
(a)



(b)

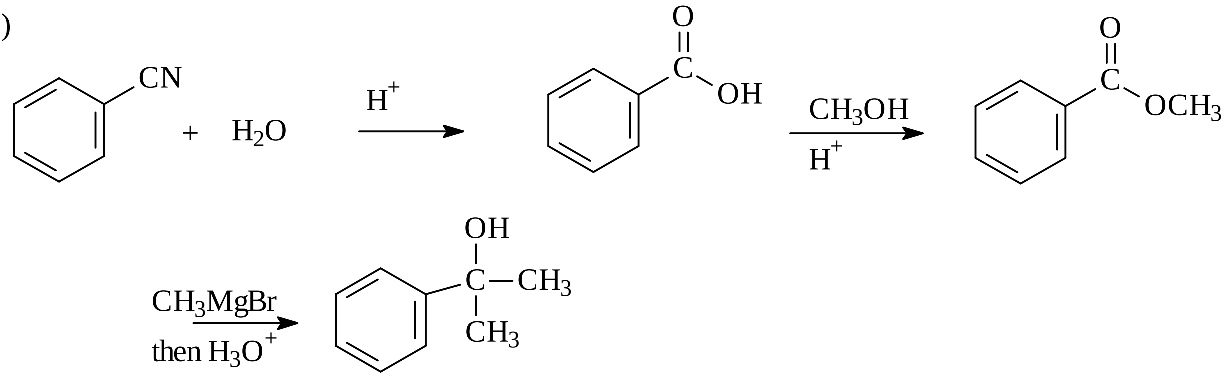


(c)



$$(CH_3)_2CHC\equiv CH \quad + \quad H_2O \xrightarrow[Hg^{++}]{H^+} (CH_3)_2CH\overset{\overset{O}{\|}}{C}-CH_3 \xrightarrow[\text{then } H_3O^+]{CH_3MgBr} (CH_3)_2CH\underset{CH_3}{\overset{OH}{C}}-CH_3$$

(d)



7. (a) The first compound will react fastest. The intermediate is resonance stabilized.

(b) Must be Sn2. The first product will be meso and therefore inactive. If Sn1 mechanism was followed, both reactions would give same product.

(c) Second reaction, First reaction will not proceed since alkenes do not react with nucleophiles.