FINAL EXAM, 59-135, INTERSESSION, 1991

1.

(a) $(CH_3)_2CHCH=CH_2$ (H^+ cat)

(b) $CH_3CH_2CH=O$ + 2 CH_3CH_2OH (H^+ cat)

(c) $SOCl_2$

(d) $CH_3CH_2CH_2CHCH_2CH_3$ (S config)
CN

(e) CH_2COOH (H^+ cat)

(f) $CH-CH_3$, CH_3

(g) CH_3, OH

(h) $LiAlH_4$, then H^+

(i) CH_2CCH_3 (O)
(H^+, Hg^{++} cat)

(j) $(CH_3)_2CHCH_2CH_2CH_2OH$

(k) CN, $CHCHCH_3$, I

(l) OH, C

(m) CH_3O, CH_3, Br

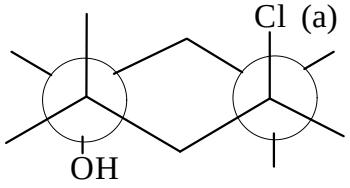
2. (a) (i) diastereomers (ii) identical (iii) diastereomers

(b) CH_3, H–Cl, H–Cl, H–Cl, H–Cl, H–Cl, CH_3

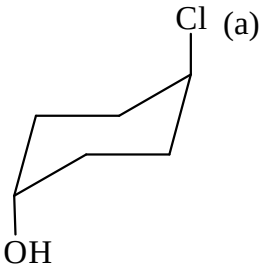
CH_3, Cl–H, H–Cl, H–Cl, H–Cl, Cl–H, CH_3

(c) CH_3, H–OH, =O, H–OH, H–Br, C_2H_5

(d)



(a)



(a)

3. (a) The second reaction has a better nucleophile. This favours Sn2 and therefore this reaction is more likely to go via a Sn2 mechanism.

(b) The second reaction will have the larger K_{eq} since F is more electronegative than Cl.

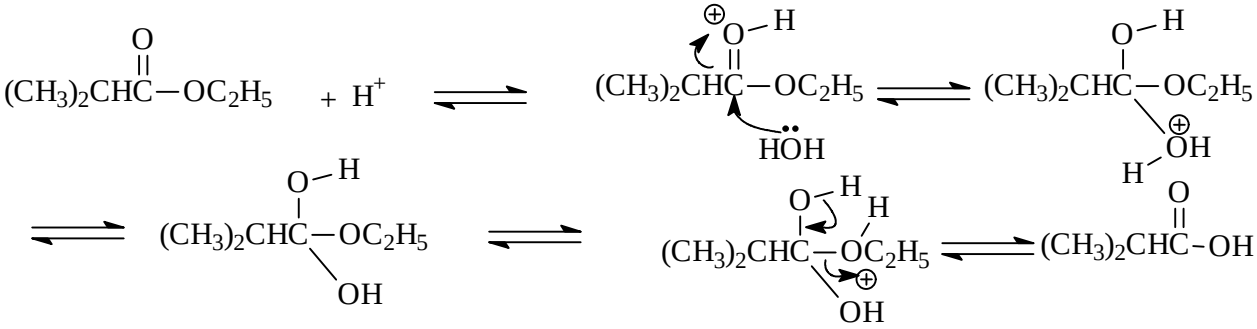
(c) The second reaction will be faster since there is more steric hindrance in the first with the adjacent $(CH_3)_3$ group.

(d) The first reaction since I is a better leaving group.

(e) The second will favour eleimination because CH_3O- is a stronger base and also bigger.

4. (a) BH_3 followed by H_2O_2
(b) H_2 in the presence of a catalyst (Ni or Zn or Pd etc.).
(c) O_3 followed by Zn reduction.

5.



overall $(CH_3)_2CHC(=O)OC_2H_5 + CH_3OH \overset{H^+}{\rightleftharpoons} (CH_3)_2CHC(=O)OCH_3 + C_2H_5OH$

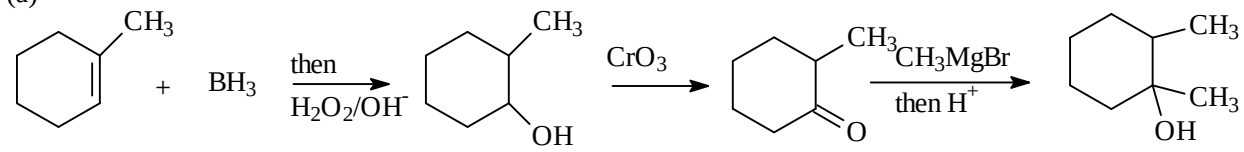
6. (a) Lucas Test. Mix each sample with conc. HCl. The one that develops the cloudiness first is 2-butanol

(b) Ad Br_2. The sample in which the colour remains is 3-chlorobutane. The other sample will remain colourless.

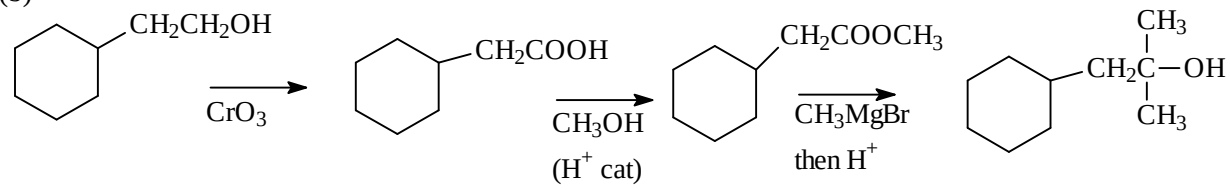
(c) Test with blue litmus paper. The sample that turns the paper red is the acid.

7.

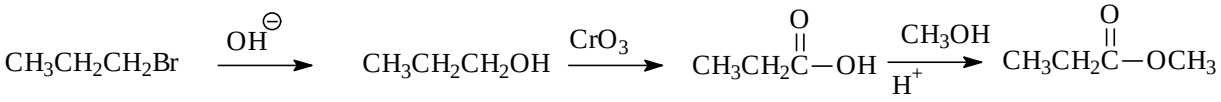
(a)



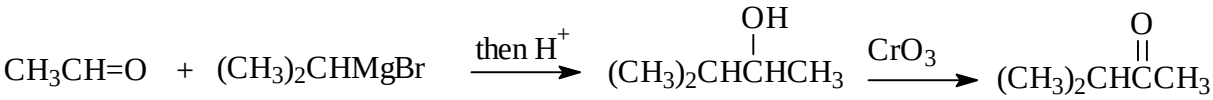
(b)



(c)



(d)



8. The preferred orientation for the Br atom during elimination is in the axial position since only in this conformation can it be coplanar with the eliminating H atom. In the <u>cis</u> isomer, when the Br is axial, the ethyl group will be equatorial. It takes less energy to achieve the required conformation than in the <u>trans</u> configuration where <u>BOTH</u> substituents must be axial when the Br is axial. This is much higher in energy.