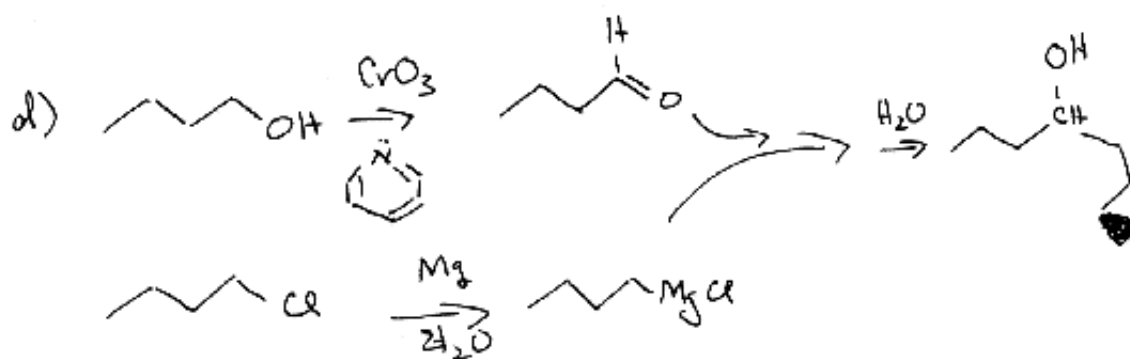
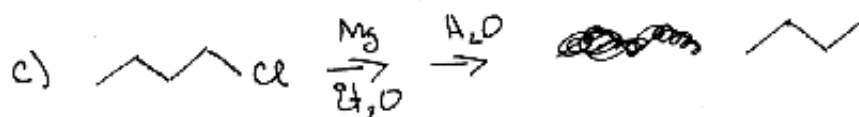
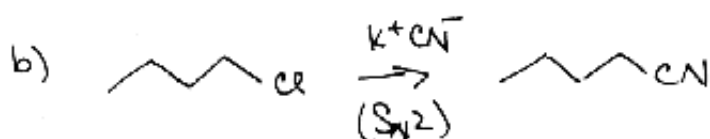
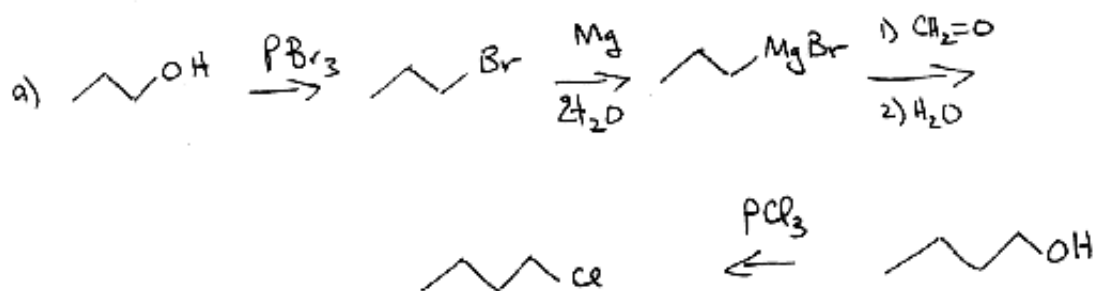


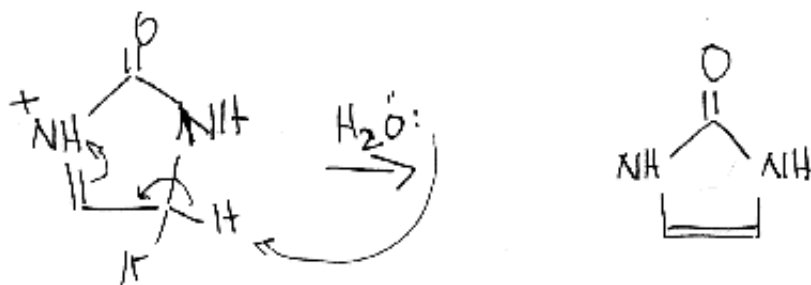
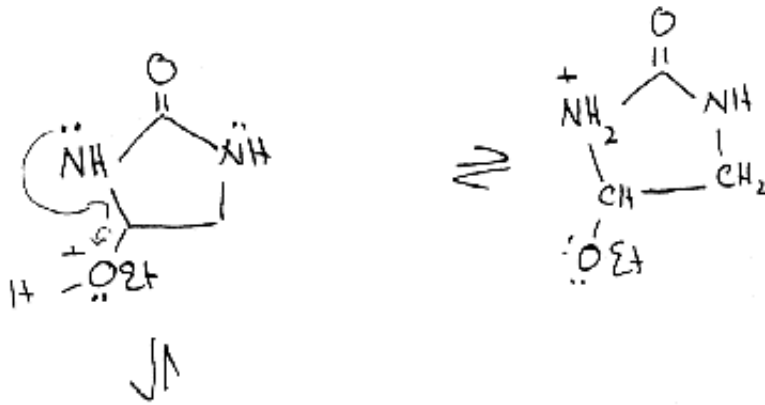
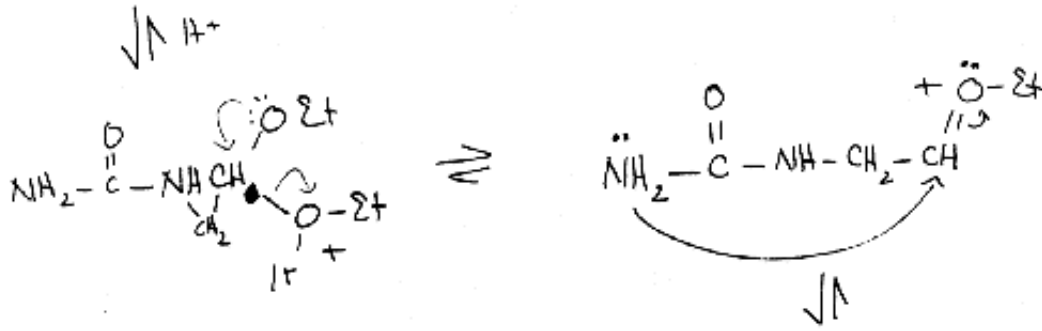
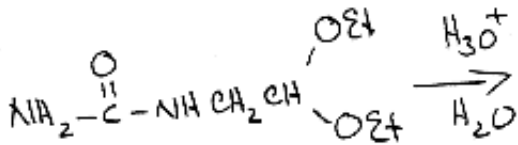
Name: Key (please print)

1. (20 pts) Starting from propyl alcohol, devise syntheses of the following:

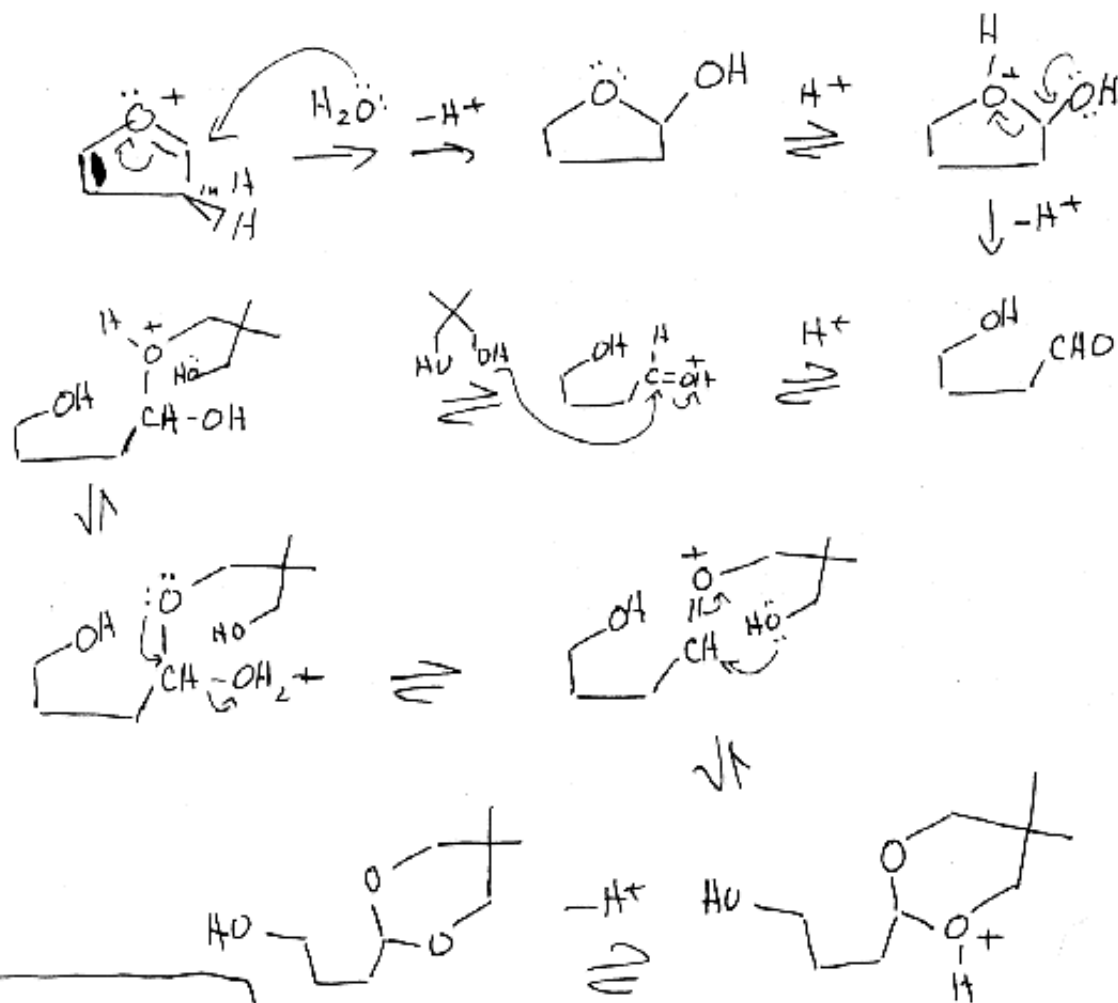
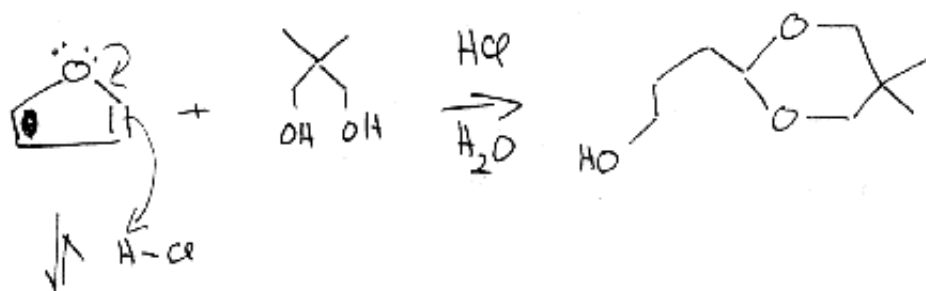
- a)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Cl}$
- b)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CN}$
- c)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$
- d)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}(\text{OH})\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$



2. (10 pts) What is the mechanism for the following reaction?



3. (10 pts) What is the mechanism for the following reaction?



There is a second mechanism that involves attack of C(C)(C)O on C1=CC=CC=C1 directly. This is ok too.

4. (20 pts) Provide structures for compounds A, B, C, and D.

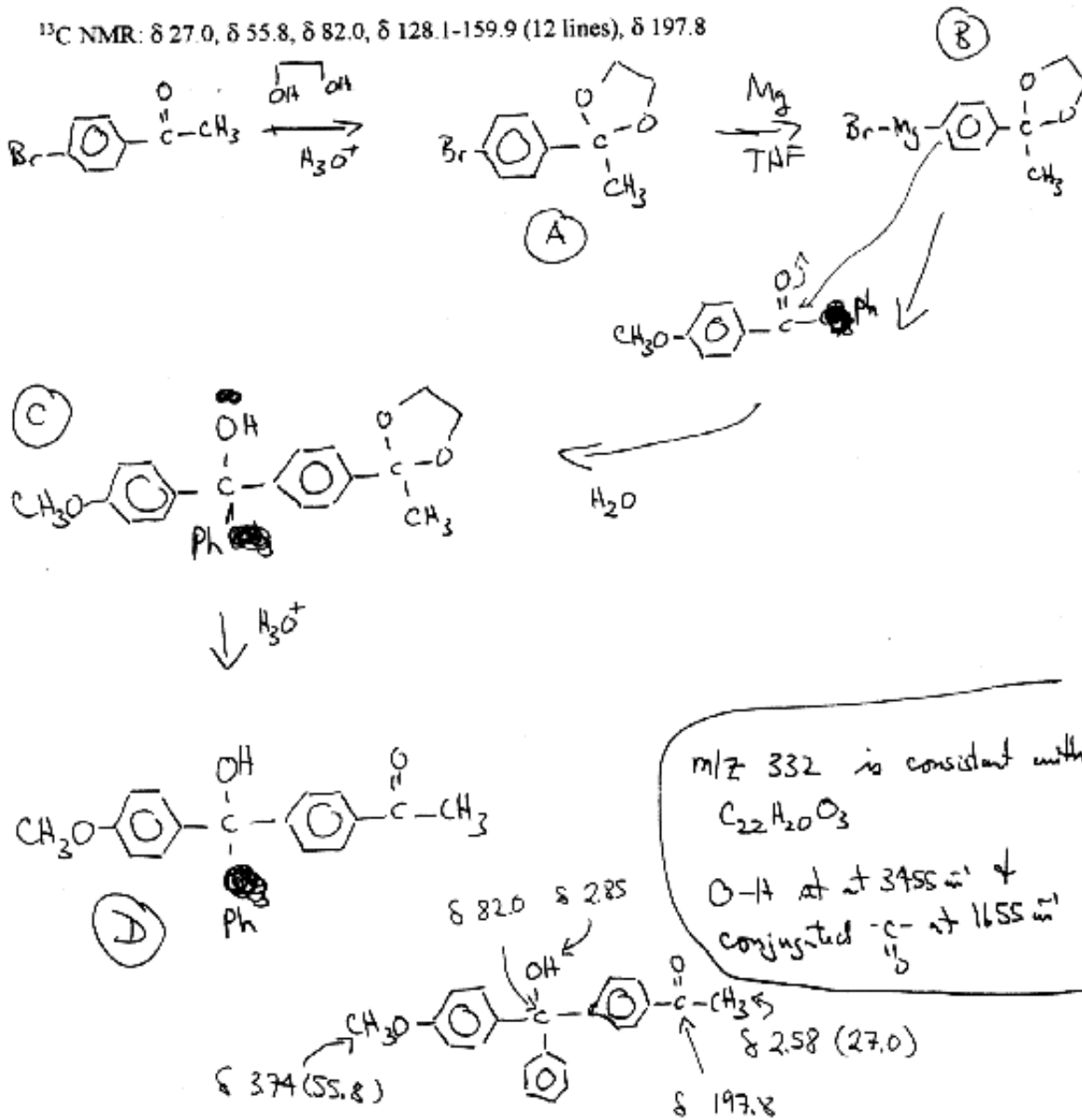
Compound D

IR(KBr): 3455(s) and 1655 (s)  $\text{cm}^{-1}$ .

Mass Spectrum:  $m/z$  332 (p, 82%), 255 (85%), 213 (100%), 147 (37%), 135 (43%), 106 (48%), 77 (25%), 43 (25%)

$^1\text{H NMR}$ :  $\delta$  2.58 (s, 3H),  $\delta$  2.85 (s, 1H vanishes when a drop of  $\text{D}_2\text{O}$  is added),  $\delta$  3.74 (s, 3H),  $\delta$  6.77-7.98 (m, 13H).

$^{13}\text{C NMR}$ :  $\delta$  27.0,  $\delta$  55.8,  $\delta$  82.0,  $\delta$  128.1-159.9 (12 lines),  $\delta$  197.8



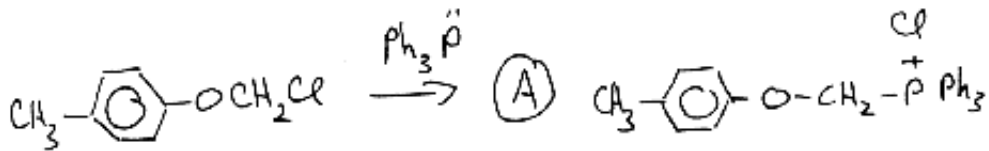
5. (20 pts) Provide structures for compounds A, B, C, and D.

Compound D

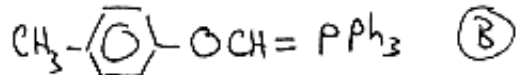
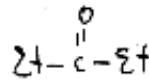
IR(neat): 2817(w) and 2717 (w), 1730 (s)  $\text{cm}^{-1}$ .

$^1\text{H NMR}$ :  $\delta$  0.92 (t,  $J = 7$  Hz, 6H),  $\delta$  1.2-2.3 (m, 5H),  $\delta$  9.51 (d,  $J = 2.5$  Hz, 1H).

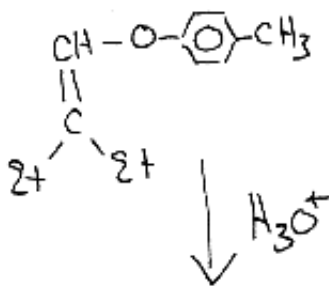
$^{13}\text{C NMR}$ :  $\delta$  11.4,  $\delta$  21.5,  $\delta$  55.0,  $\delta$  205.0



$\downarrow \text{PhLi}$



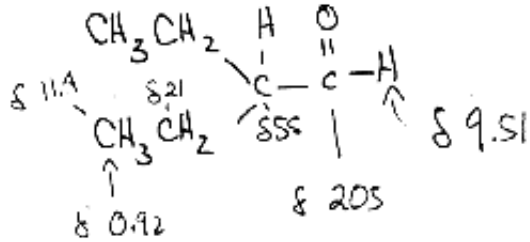
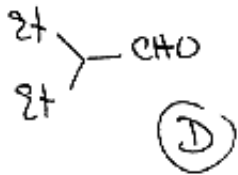
(C)



$\delta$  1.2-2.3

2817  $\text{-C-H al.}$   
2717

1730  $\text{-C=O al.}$



6. (20 pts) What are the principal organic products of the following reactions?

