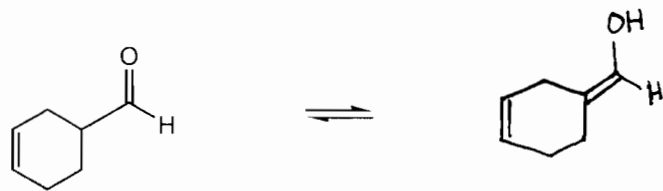


1. (4 pts) Draw the Enol form of the aldehyde below.

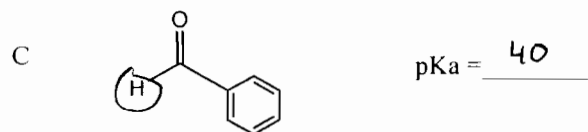
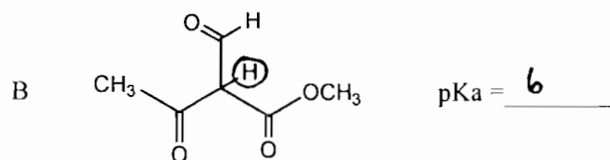
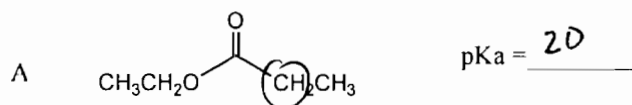


Enol

2a. (3 pts) Match the pKa values listed below with the most acidic hydrogen(s) in A, B and C. Possible pKa values: pKa = 6 pKa = 20, pKa = 40

b. (3 pts) For each compound (A,B, and C) **circle the hydrogen(s)** that are most acidic.

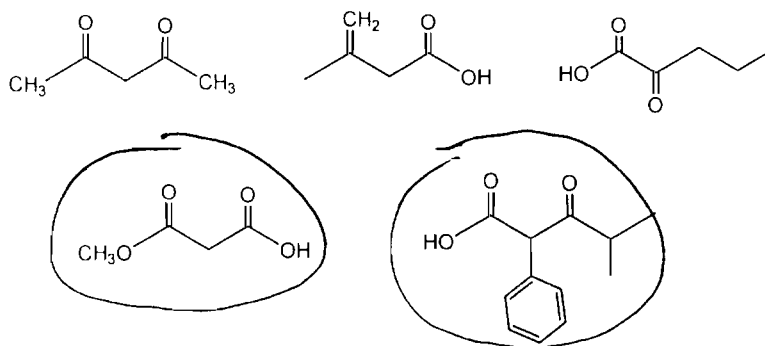
c. (2 pts) Which compound(s) (A-C) would be completely deprotonated by NaOH? (Note: the pKa of water is 15.7) B - pKa 6 is less than 15.7



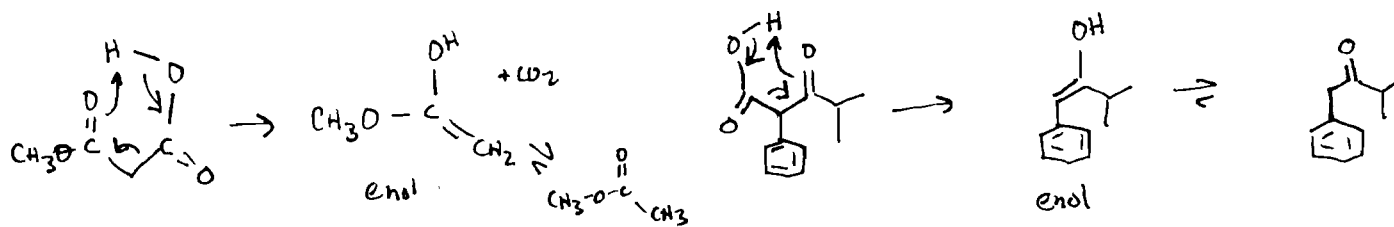
3. (8 pts) **Circle** what is **true** about oxidation/reduction

- a) An aldehyde is more oxidized than an alcohol
- b) A ketone is more reduced than a carboxylic acid
- c) A ketone is a better fuel (has more potential energy) than an alcohol
- d) Compounds with high potential energy are oxidized forms of carbon
- e) Humans are 'reducers' as opposed to 'oxidizers'
- f) Humans consume reduced forms of carbon for food (energy)
- g) During photosynthesis, plants reduce carbon dioxide.

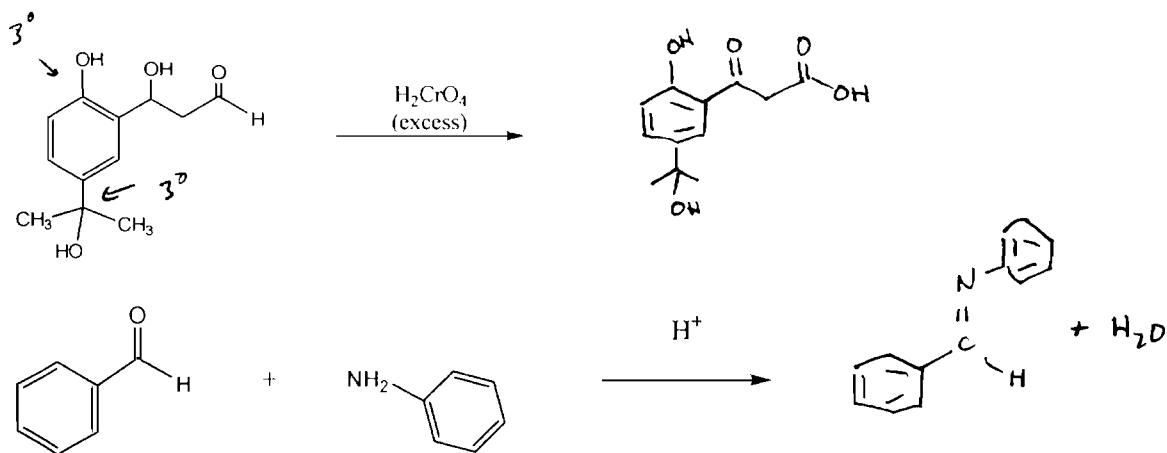
4. a. (4 pts) Circle the compound(s) below that would be expected to decarboxylate (lose CO<sub>2</sub>) when heated.



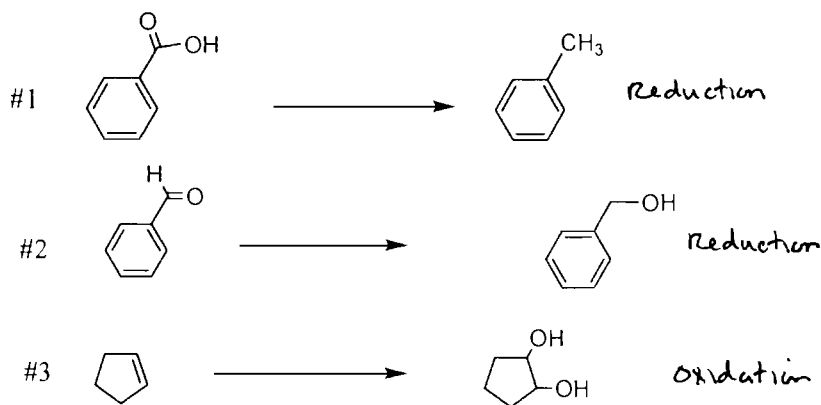
b. (5 pts) Depict the decarboxylation mechanism for **one** of the compound you circled above.



5. (7 pts each) Draw the expected organic products of the reactions shown below



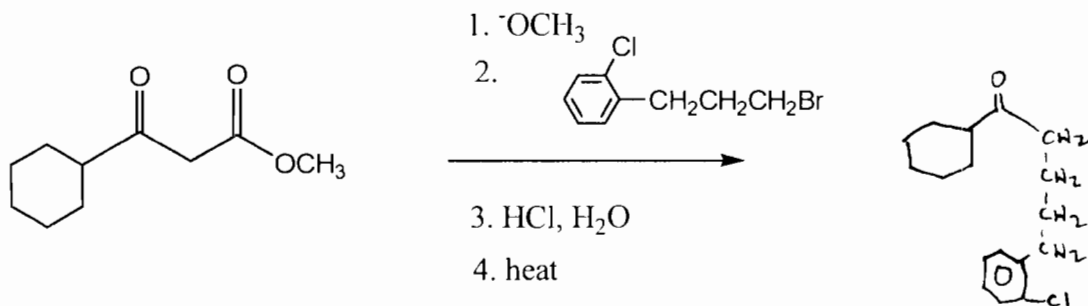
6 (6 pts) For each reaction, is the organic molecule being oxidized or reduced?



b. (3 pts) Which reaction(s) above (1-3) would release heat (would be an exothermic reaction)?

#3

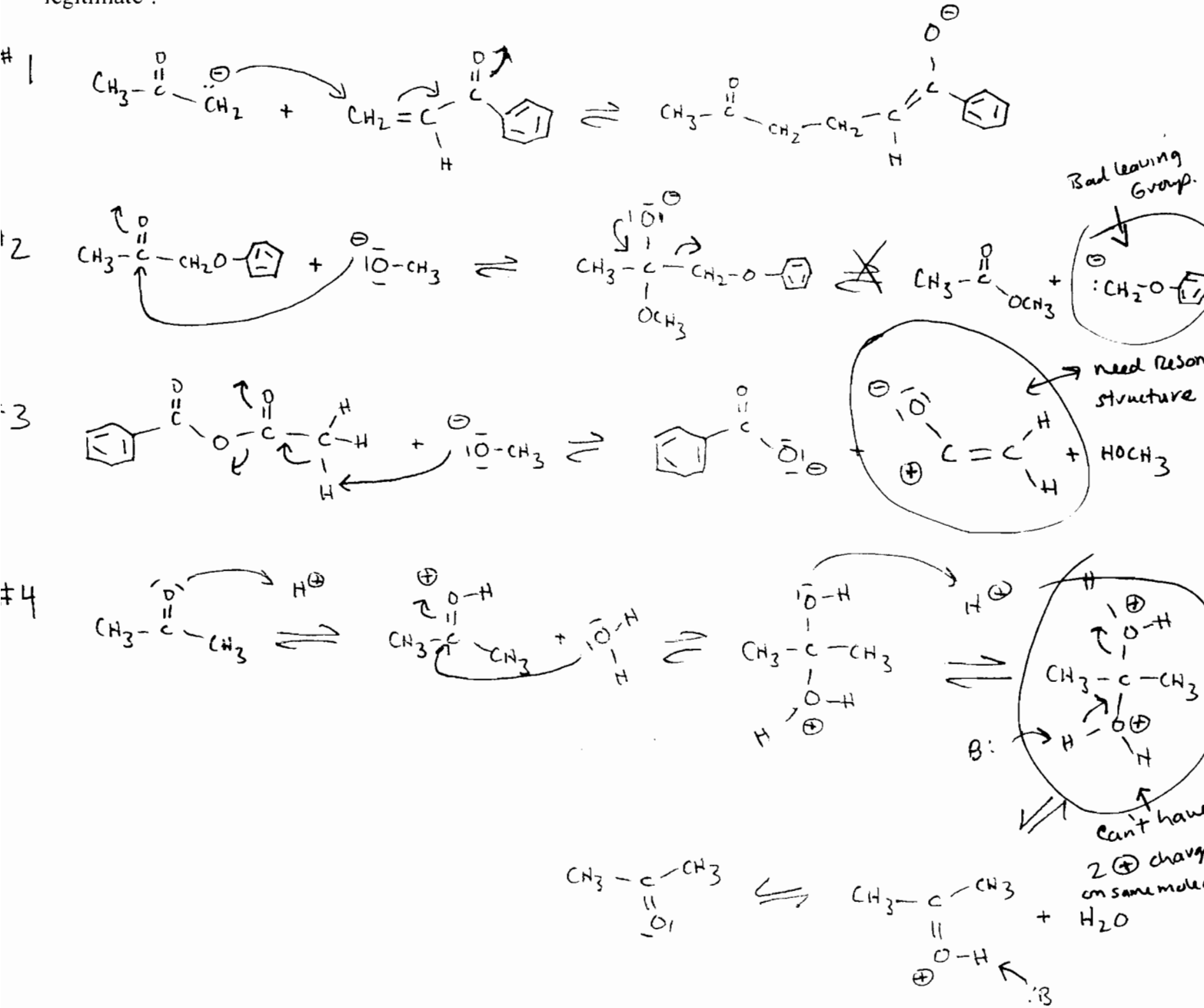
7. (6 pts) Fill in the **final product** of the synthesis shown below. You do not have to draw the structures, after each step—just the final product.



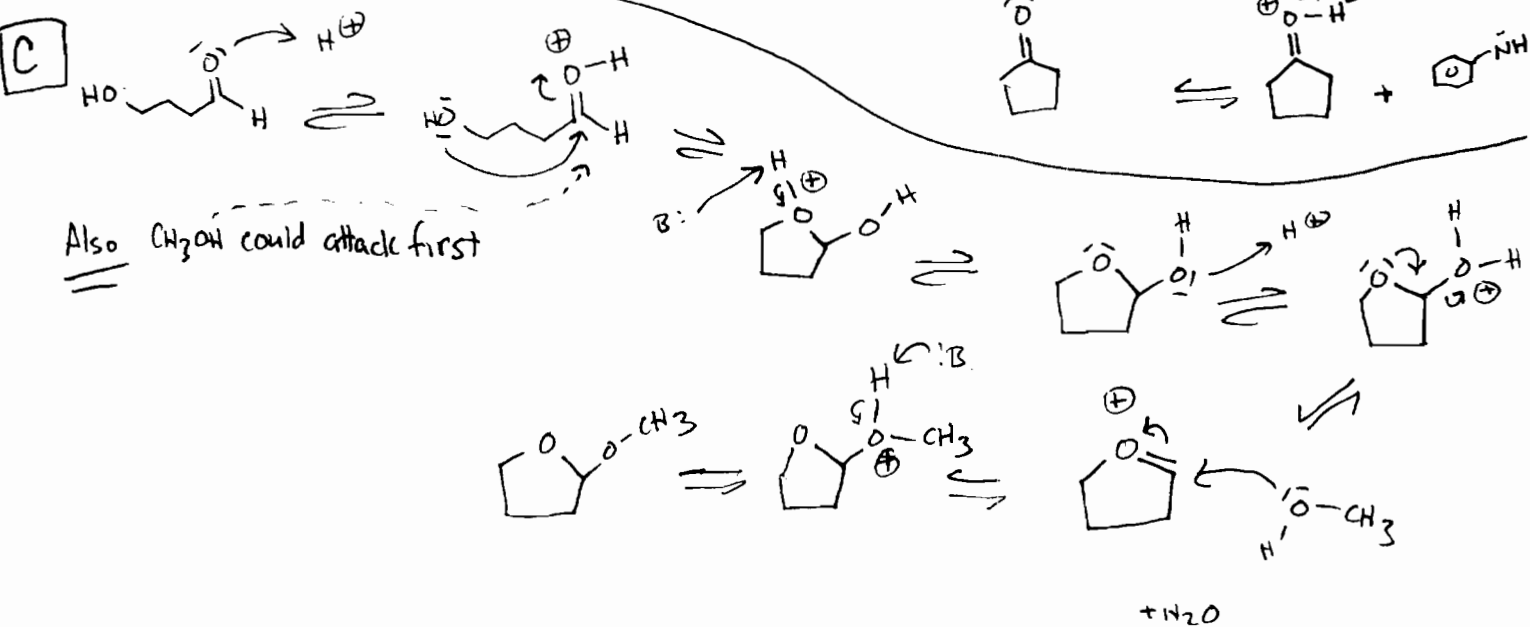
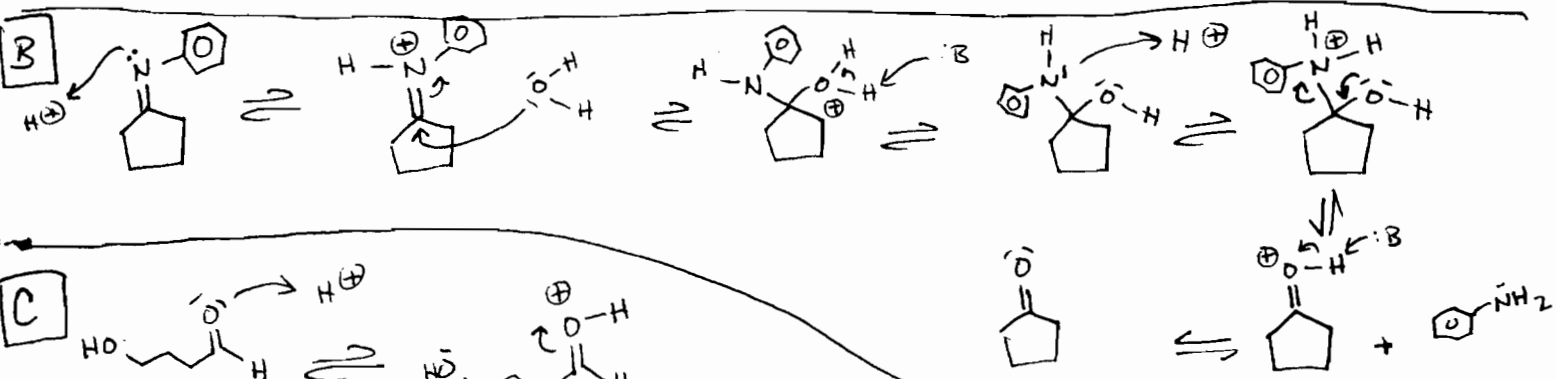
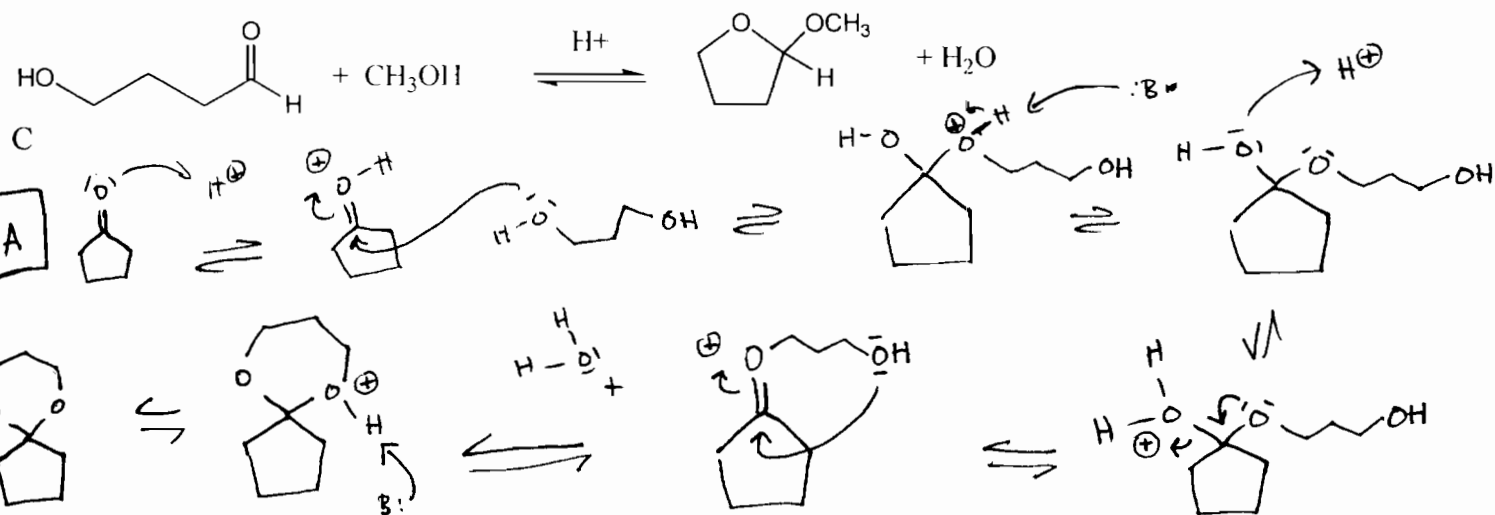
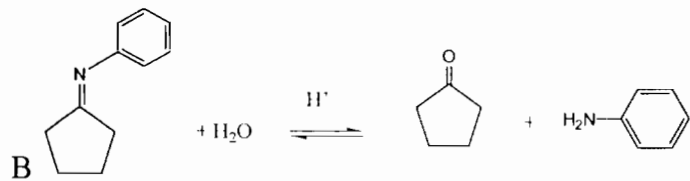
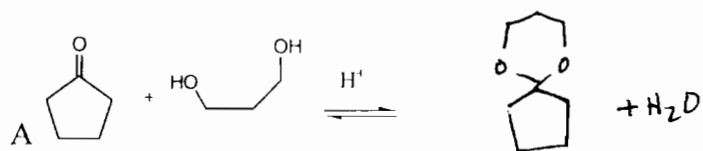
is o.k. if show resonance

8. (4 pts) a. For the reaction mechanisms drawn below (#1-4) which ones are erroneous? #2, #3, #4

b. (6 pts) In the mechanism(s) that you declared erroneous in part a, **circle** the step/intermediates that are not 'legitimate'.



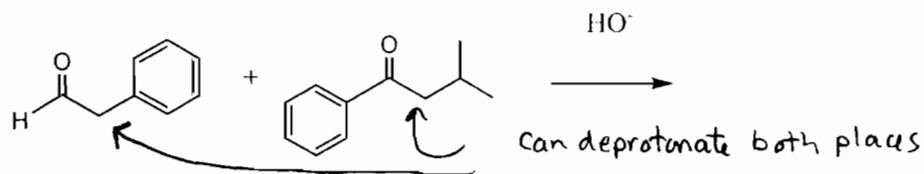
9 (16 pts) Draw the **mechanism** and product for **one** the reactions below (A, B or C). It is your choice on which you do. Note that some of the reactions do not have the product drawn in while others do.



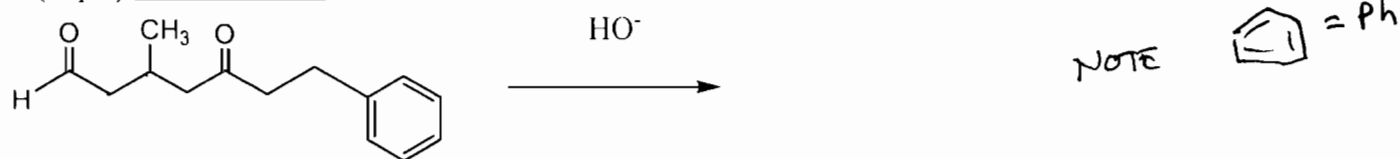
+H<sub>2</sub>O

**10 (15-20 pts each)** Draw the **mechanism** and product for **one** the reactions below (A, B or C). **It is your choice on which you do.** Note that they have slightly different point values depending on degree of hardness.

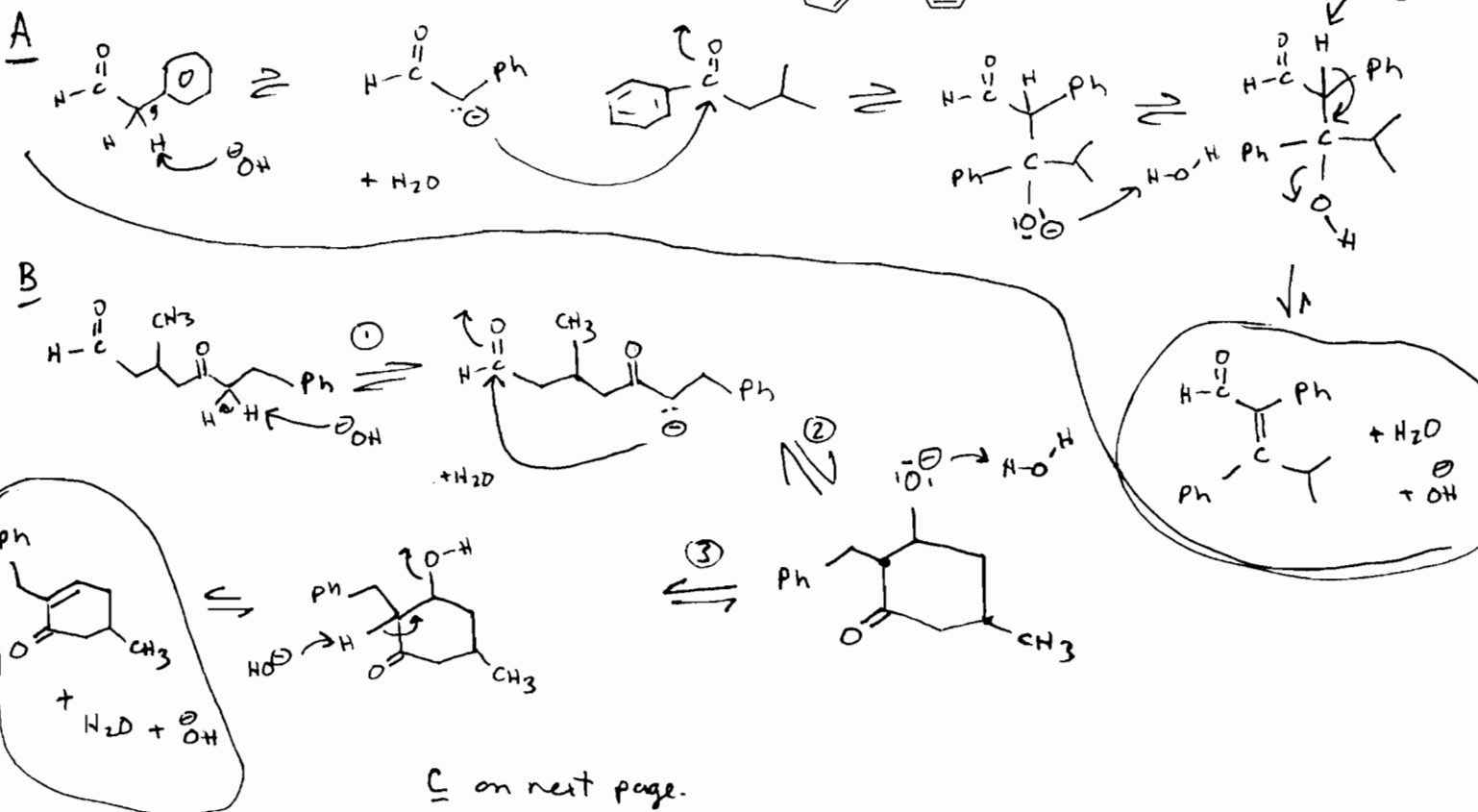
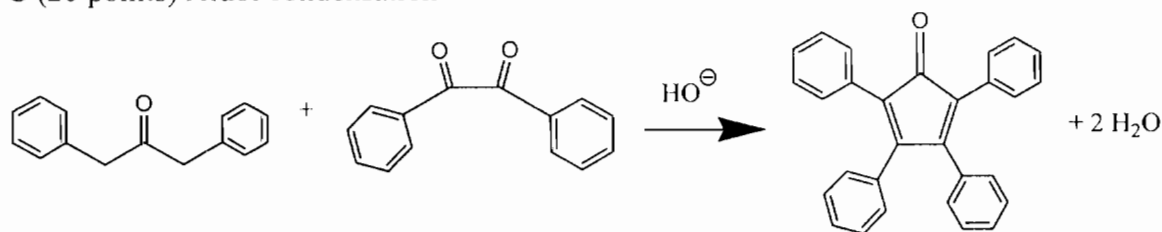
A. (15 pts) Aldol condensation-show mechanism for only **one** of the aldol condensation products (your choice to which one you show). Assume heat is added at the end of the reaction.



B (18pts) Intermolecular Aldol condensation. Assume heat is added at the end of the reaction



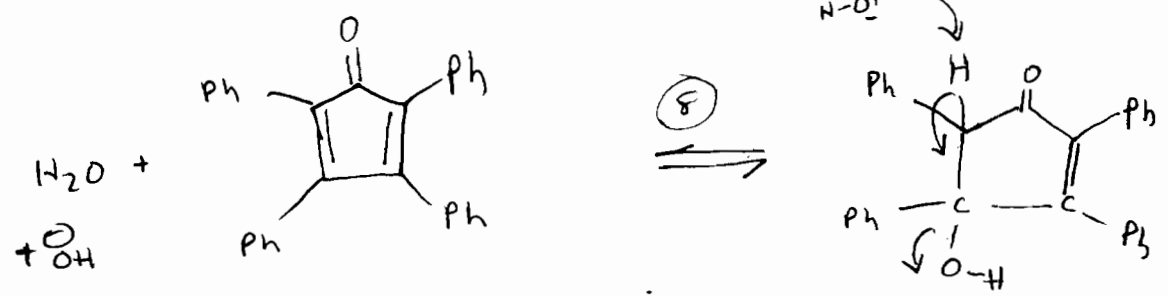
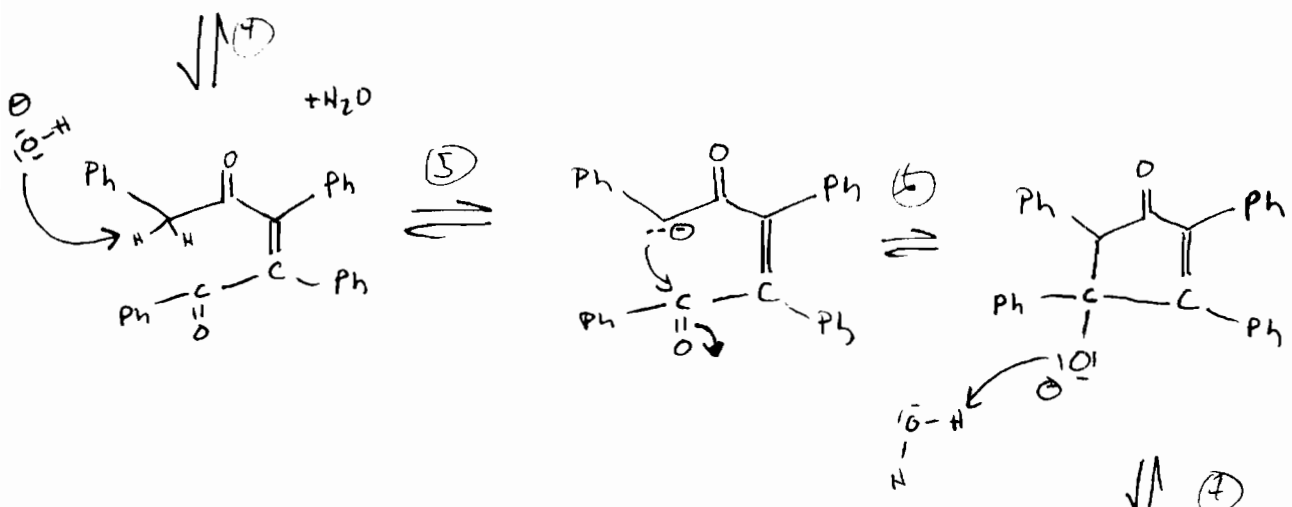
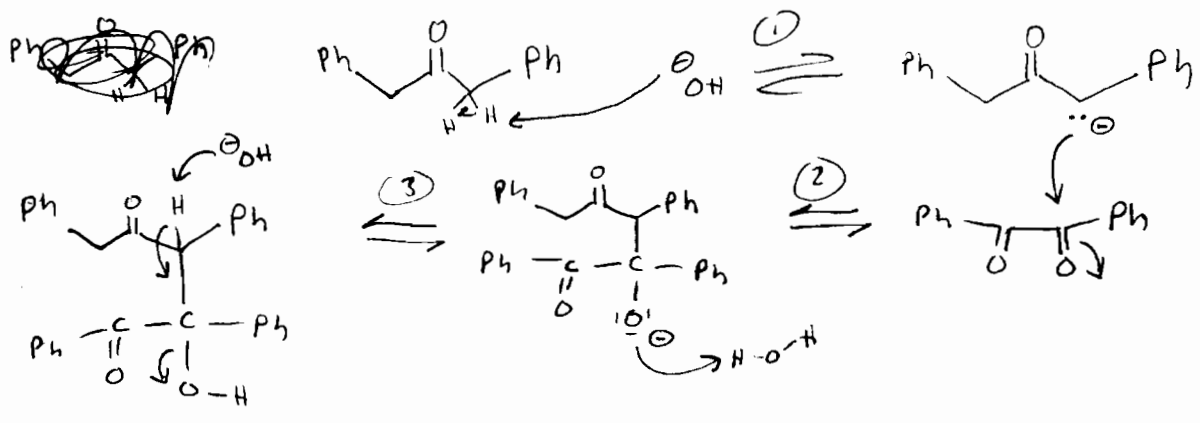
C (20 points) Aldol condensation



**Bonus question (+2)** If you were dictator for a year, what policy/program would you implement to help reduced our dependence on oil.

Kansas and Nebraska Become very Big Solar panels.

$\text{C} = \text{C} = \text{Ph}$



Tetraphenyl cyclopentadienone  
(purple color)