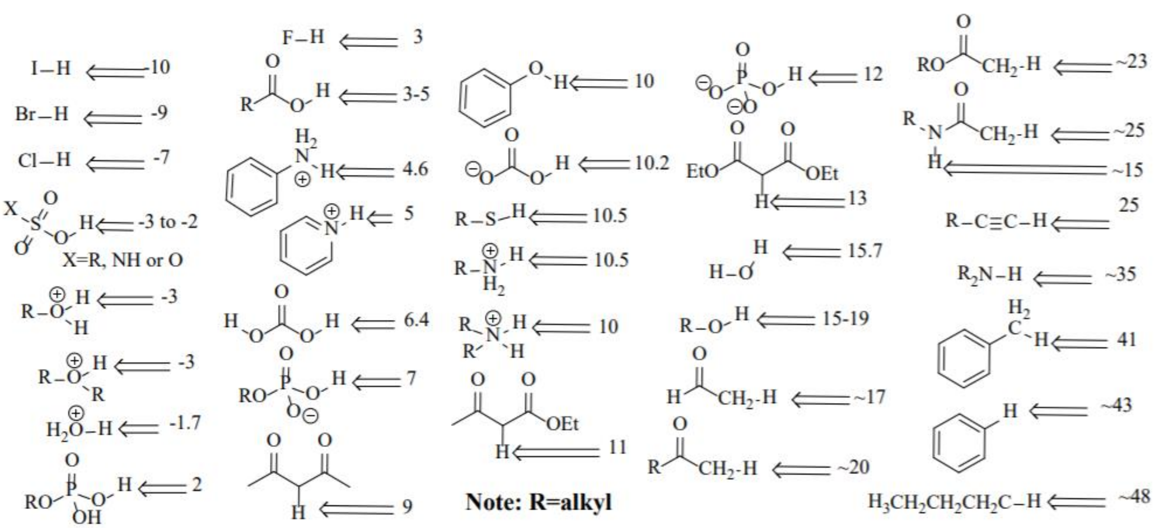
Name: ________________________________

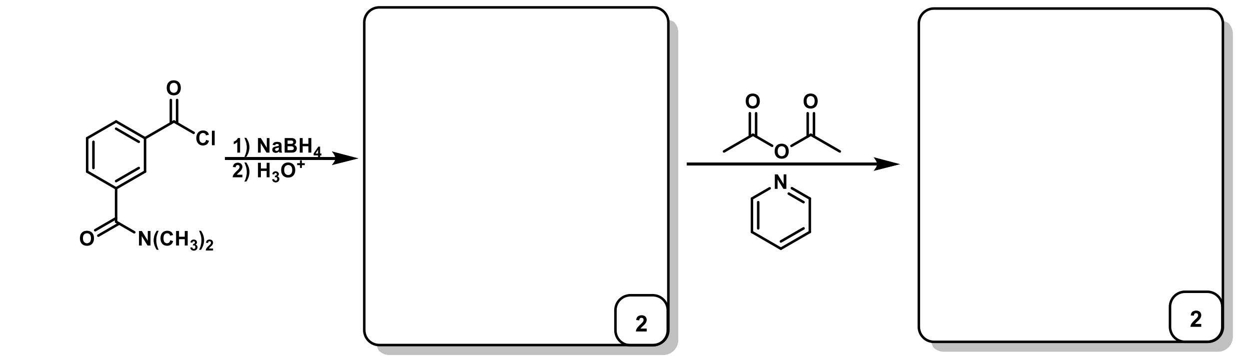
IA	IIA	IIIB	IVB	VB	VIB	VIIB	VIIIB			IB	IIB	IIIA	IVA	VA	VIA	VIIA	0
1 H 1.008																	2 He 4.003
3 Li 6.941	4 Be 9.012											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.06	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.90	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.70	29 Cu 63.55	30 Zn 65.38	31 Ga 69.72	32 Ge 72.59	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (98)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57 * La 138.9	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226.0)	89 ** Ac (227)	104 Rf	105 Ha	106 Unh	107 Uns	108	109 Une									

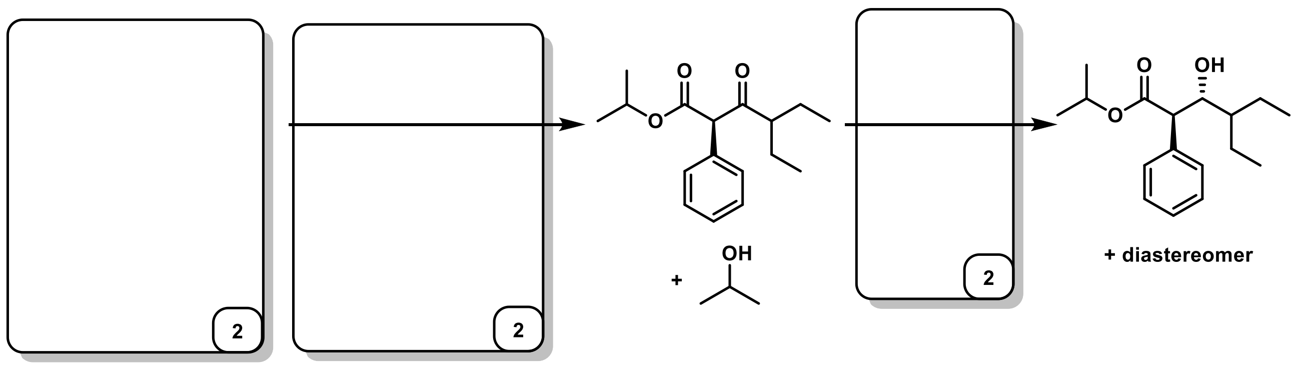
* 58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (145)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0
** 90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (244)	94 Pu (242)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (260)

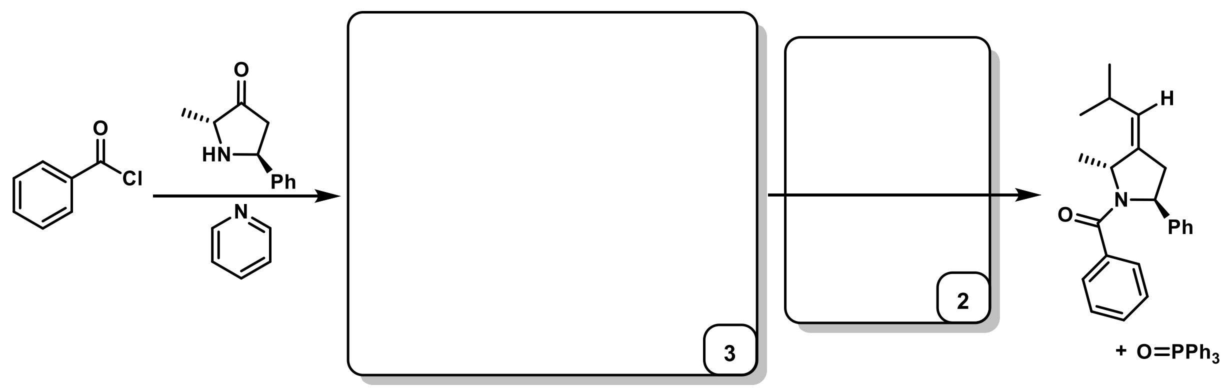
pK_a information

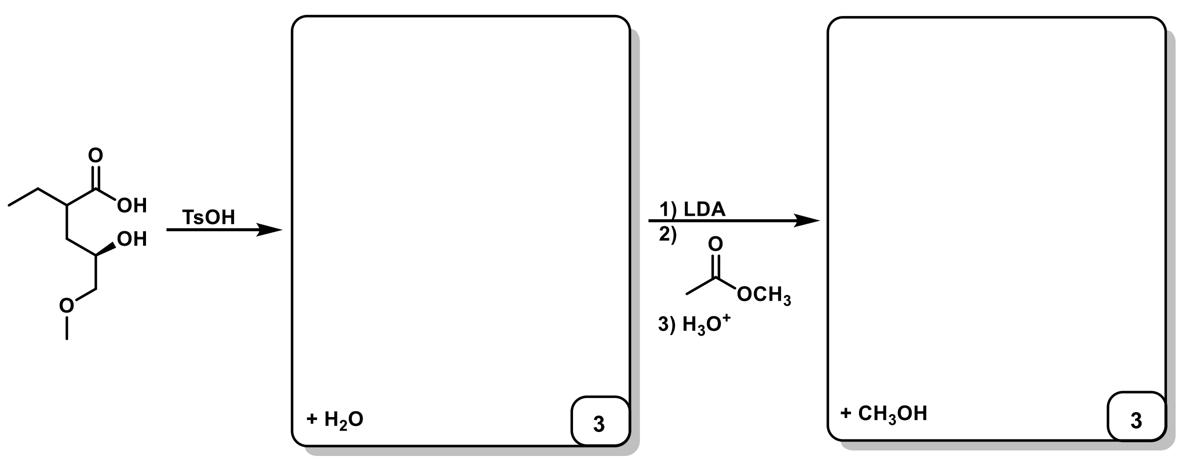


1. **Quick Synthesis.** Fill in the boxes with either the correct starting materials, reagents or products. You can ignore stereochemistry for all enolate-derived chemistry, but you should consider stereochemistry for all other chemistry, where appropriate. (21 points)

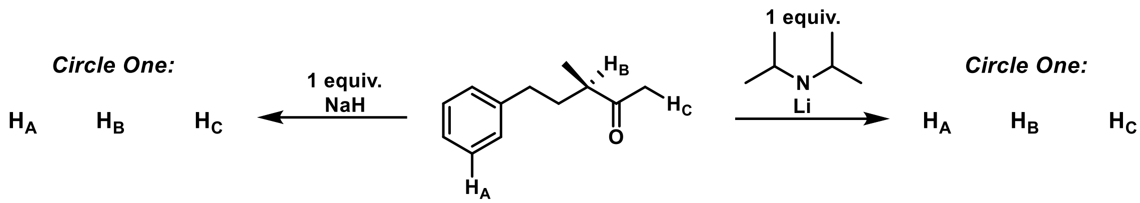


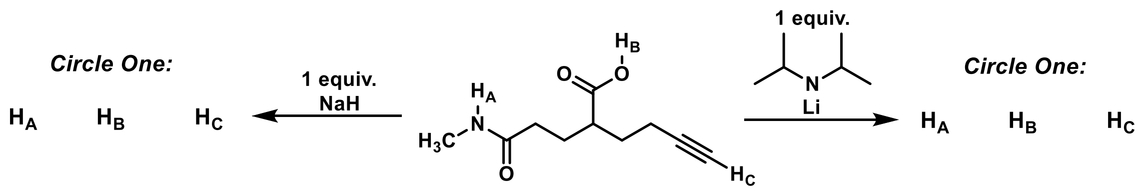




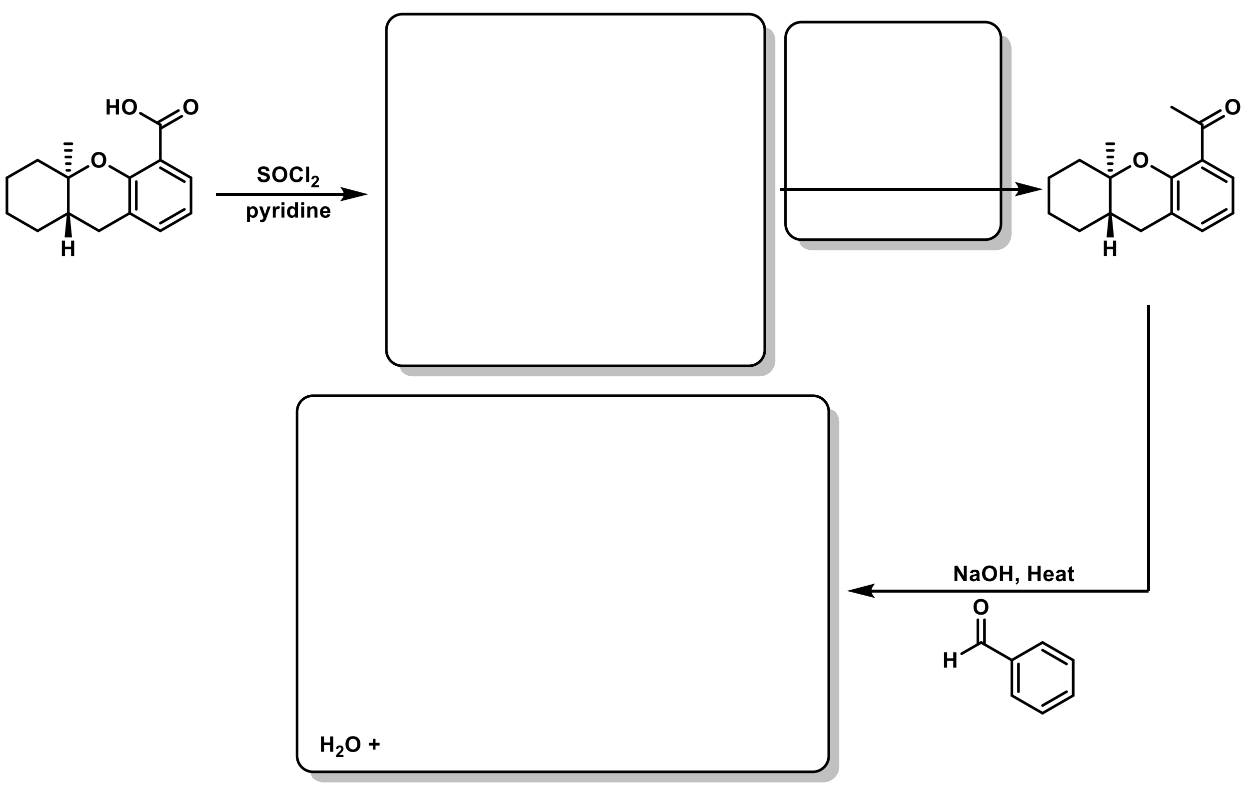


2. **Acid / Base.** For each acid / base reaction, circle the correct hydrogen that would be deprotonated under the conditions indicated. (8 pts)

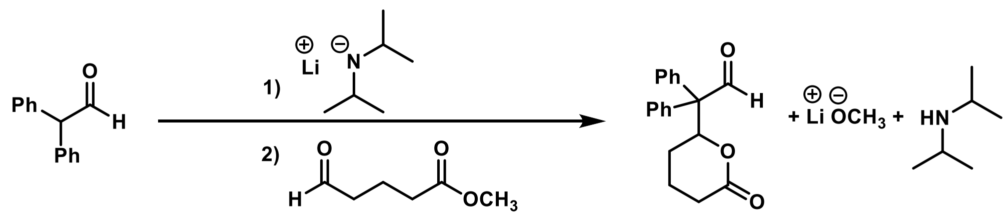




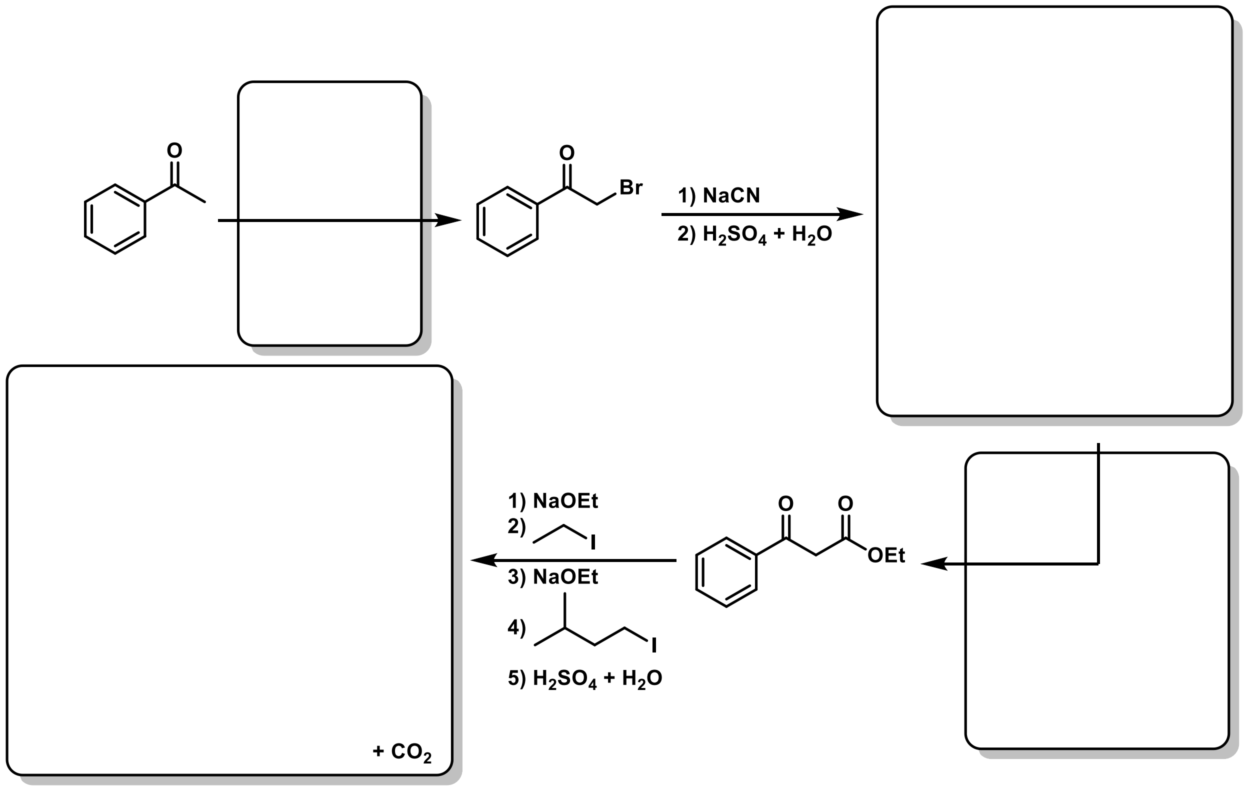
5. **Guided Synthesis.** Fill in the missing reagents / intermediates / products to complete the following synthetic scheme. (12 points)



3. **Mechanism.** Provide a step-wise mechanism for the following transformation. *Hint:* the correct mechanism will combine chemistry / mechanisms you learned in both Ch 20 and Ch 21. (15 points)

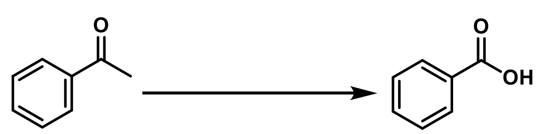


6. **Guided Synthesis.** Fill in the missing reagents / intermediates / products to complete the following synthetic schemes. (12 points)



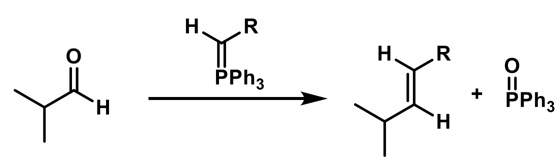
7. **Multiple Choice.** Select the letter that best answers the questions posed. (10 points)

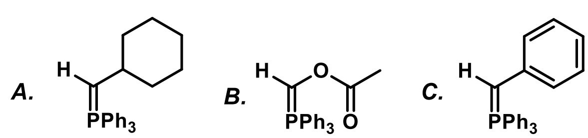
Which of the following sets of conditions would produce the desired product?



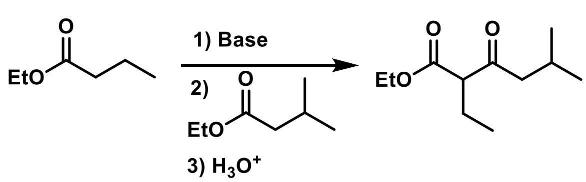
A. 1) Br_2 + NaOH 2) H_3O^+ ***B.*** 1) NaOH 2) H_3O^+ ***C.*** 1) H_3CMgBr 2) H_3O^+

Which ylide would provide the stereochemical outcome shown below?



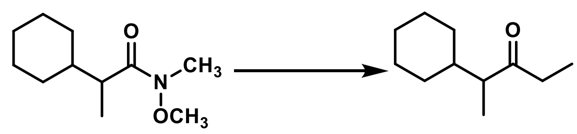


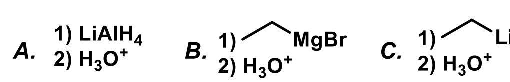
What is the best base choice to complete the following transformation?



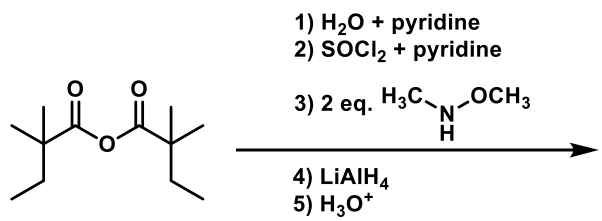
A. NaOEt ***B.*** LDA ***C.*** $NaOCH_3$

Which reagents would accomplish this reaction?

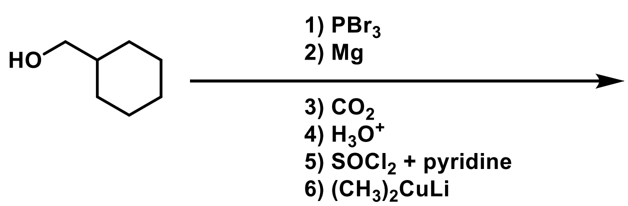




8. **Less-Guided Synthesis.** First, complete the first two synthetic pathways to determine *Product 6A* and *Product 6B*. Then, in the final box, combine these two products in the manner described to get the final product of the synthesis. (12 points)



Product 6A 5

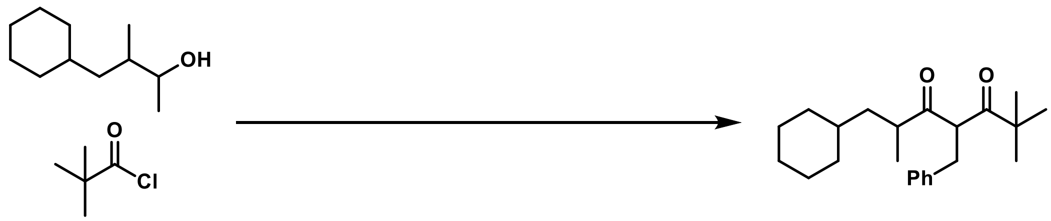


Product 6B 5

Product 6B → 1) NaH; 2) *Product 6A*; 3) H_3O^+

2

9. **Full Synthesis.** The ***Desired Product*** below can be made from the given ***Starting Materials*** using reactions we have learned in class. You must use both of the starting materials. Provide a synthesis in the box below. *Hint:* you'll want to alter both of the starting materials before reacting them with each other. (10 points)



Starting Materials ***Desired Product***