CHEM 3331 (Richardson) Midterm Exam 3 – Nov. 28, 2023

Your Name: _____

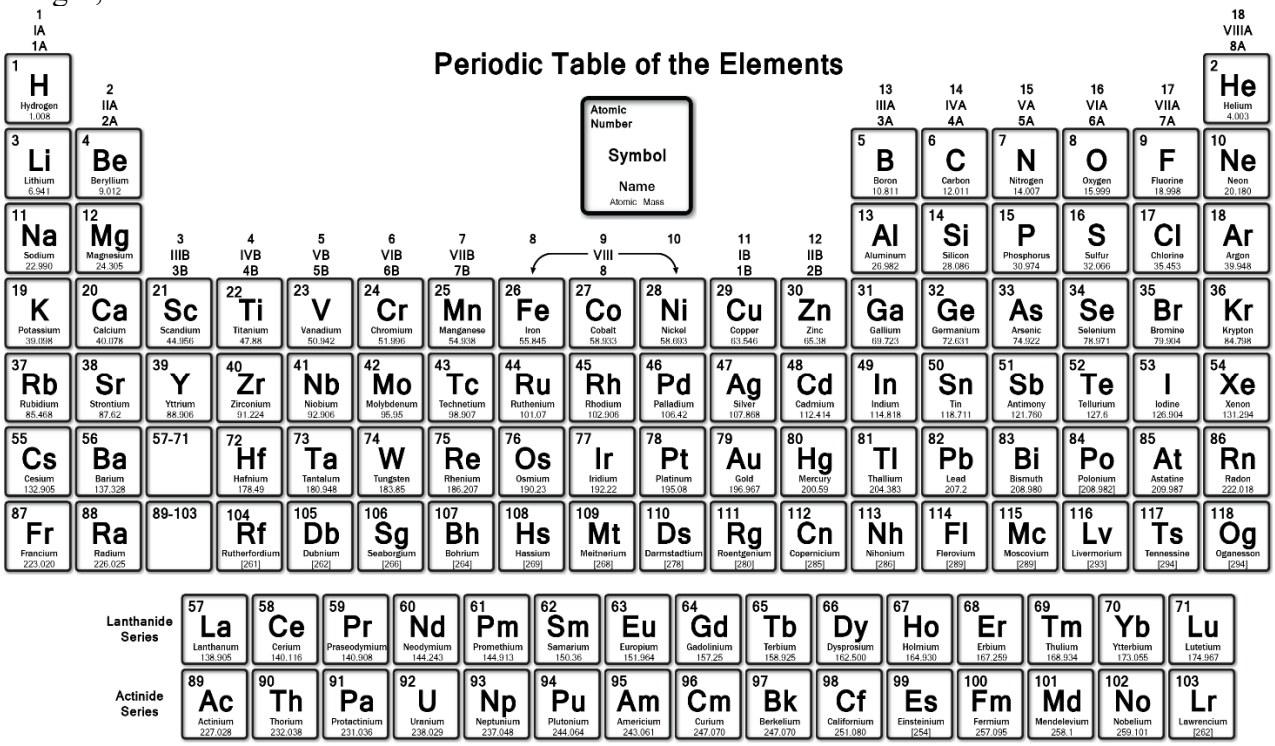
Student ID: _____

Recitation TA (fill in one circle):

O 134 (Alec Kolodziejczyk) O 142 (Kajal)
O 135 (Alec Kolodziejczyk) O 143 (Kajal)
O 136 (Lukas Gardner) O 144 (James Greenwood)
O 137 (Lukas Gardner) O 147 (Lukas Gardner)
O 141 (Kyle Fisch)

Question	Score	Out of
1		20
2		15
3		30
4		20
5		15
6		10 e.c.
Total		100

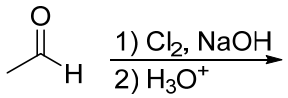
This is a closed-book exam, except for one double-sided sheet of 8.5 x 11" paper. The use of calculators or cell phones will not be allowed during the exam. You may use models sets brought in a clear bag. Use the backs of the pages for scratch work. If your final answer is not clearly specified, you will lose points. For mechanisms, show all intermediates including correct formal charges, but do not show transition states.



pKa Values

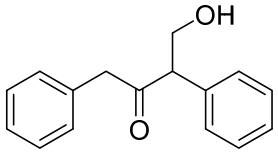
HI	-10	CH_3COOH	4.7	ArOH	10	HC≡CH	26
HBr	-8	HN_3	4.7	RSH	10-12	H_2	35
HCl	-6	H_2S	7.0	H_2O	15.7	NH_3	36
H_3O^+	-1.7	NH_4^+	9.3	ROH	16-18	$H_2C{=}CH_2$	45
HF	3.2	HCN	9.4	O=C-CH	9-25	CH_4	60

1) Predict all the products and show the mechanism for this reaction. (20 pts)

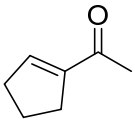


2) Show how you would use an aldol or Claisen reaction to make each compound. (15 pts; 5 pts each)

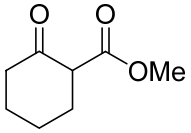
a.



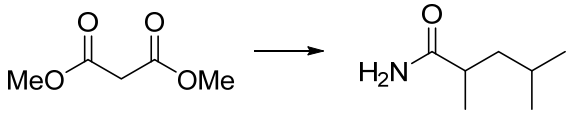
b.

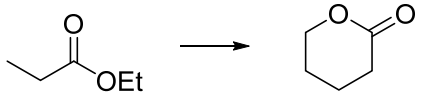


c.

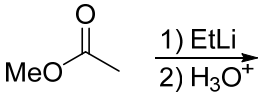


3) Find a way to synthesize the desired product from the given starting material plus any other reagents containing at most six carbon atoms. (30 pts; 15 pts each)

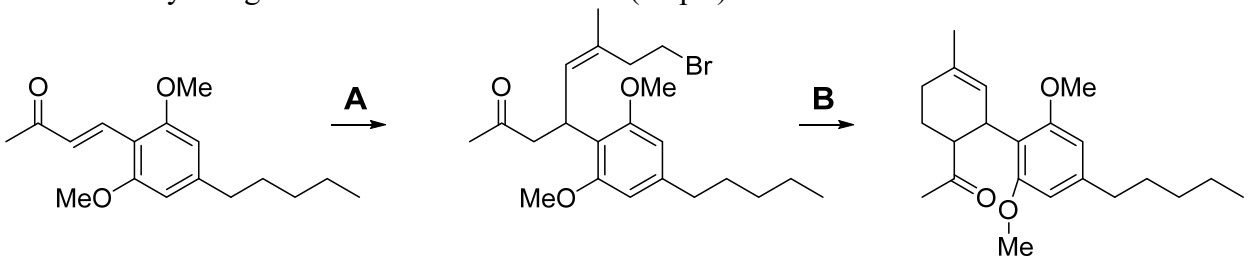
a. 

b. 

4) Predict all the products and show the mechanism for this reaction. (20 pts)



5) A recently-published synthesis of some cannabinoids used conjugate addition, followed by enolate alkylation, to make a new ring. They use chemistry we haven't covered, but we can still do this by using reactions that we did cover. (15 pts)



a. What reagents are needed for step **A**? (5 pts)

b. What reagents are needed for step **B**? (Pay attention to which proton needs to be removed!) (5 pts)

c. You might notice something unusual about the main reagent for step **A**. What problems might you encounter if you tried to synthesize this reagent? (5 pts)

6) Extra credit! The Strecker Synthesis, shown below, is used to make amino acids from aldehydes. Write a mechanism for the third step of this synthesis. (10 pts e.c.)