CHEM 3331 **Xtreem Celebration of Learning™ #3**

Dr. Minger **July 30, 2019** **Name**__________________________

1) Circle your recitation section:

211	Chance	221	Zhenhao
212	Garrett	222	Eric
213	Dania	223	Wyatt
214	Will	224	Tianyi
215	Michael (3 pm)	225	Michael (12 pm)

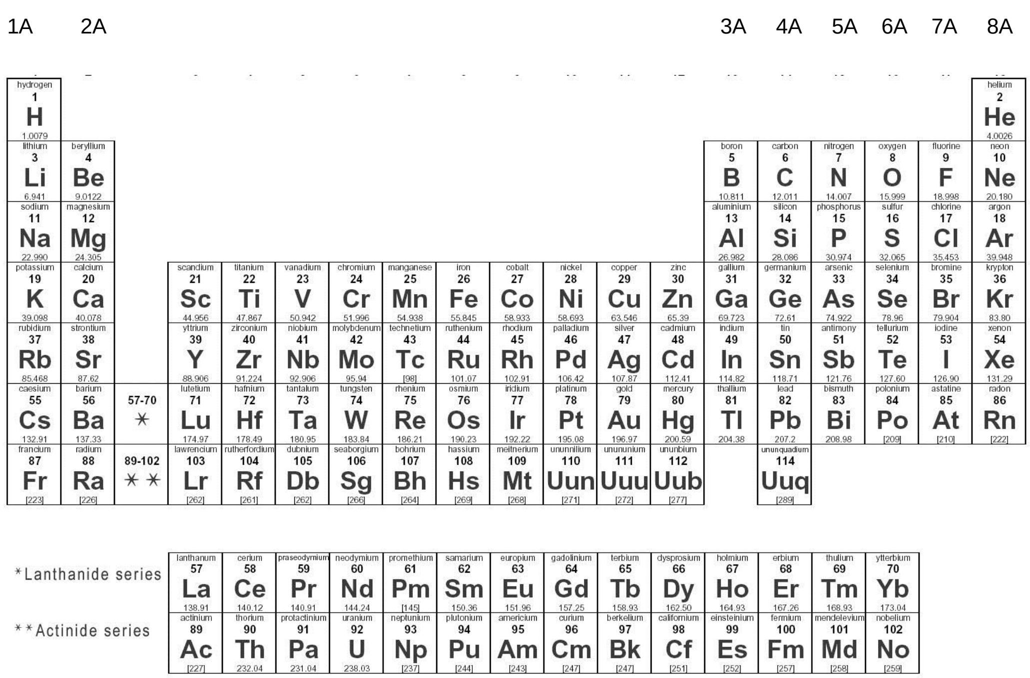
2) Sign the Honor Code statement:

I pledge on my honor as a CU student that I have neither given nor received unauthorized assistance on this exam.

____

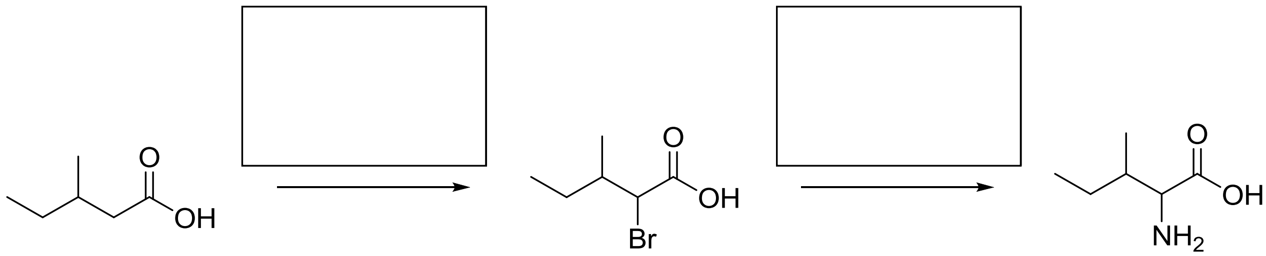
General Instructions

There are 6 questions. Be sure you have them all. Read each question carefully so that you know exactly what is being asked. IF YOU DON'T UNDERSTAND, ASK!



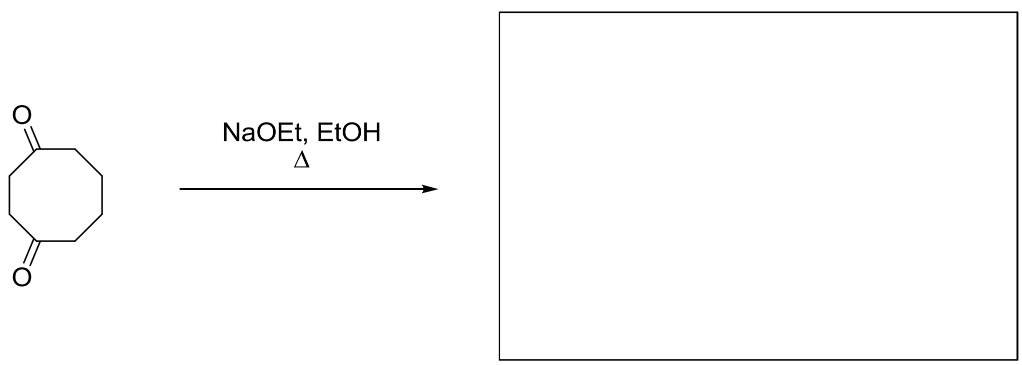
For questions 1, 2, and 3, we will only grade what is written IN the boxes.

1) Complete this short synthesis of the amino acid isoleucine by writing the missing reagents needed for each step in the boxes. (4 pts)

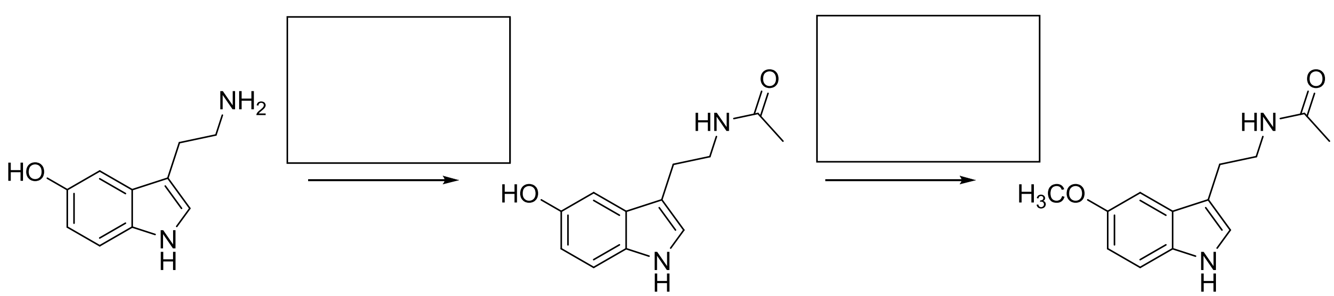


isoleucine

2) Dicarbonyl compounds can undergo intramolecular reactions. Draw the major organic product that would form under the following conditions. (4 pts)



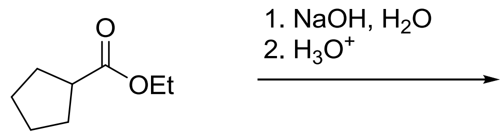
3) The neurotransmitter serotonin can be converted to a hormone called melatonin in a two step sequence. Complete this short synthesis of melatonin by writing the missing reagents for each step in the boxes. (4 pts)



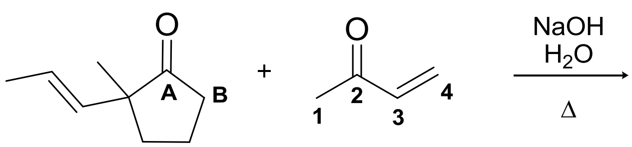
serotonin

melatonin

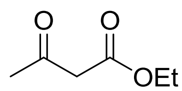
4) Draw the major organic product of this reaction in the box provided. Then draw a mechanism to rationalize its formation. Show all curved arrows, lone pair electrons and nonzero formal charges in your mechanism for full credit. (10 pts)



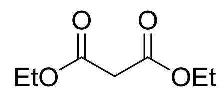
5) When the two compounds shown are combined and refluxed in aqueous sodium hydroxide, a Robinson annulation occurs. Draw the product of the Robinson annulation. In your drawing of the product, write the labels (1, 2, etc.) from the starting materials on the appropriate carbon atoms for full credit. **Only the structure in the box will be graded.** (10 pts)



6) Design a multistep synthesis of each of the following two target molecules, incorporating either an acetoacetic ester synthesis or a malonic ester synthesis as part of your sequence of steps. This means that each synthesis will start with either ethyl acetoacetate or diethyl malonate (structures given). You do not have to use the same starting material in both syntheses. Show the reagents for each step and the product of each step. Do not draw any mechanisms (curved arrows). Write your final answers in the boxes provided. **Nothing outside the boxes will be graded.** (18 pts)

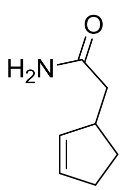


Ethyl acetoacetate
(Acetoacetic ester)

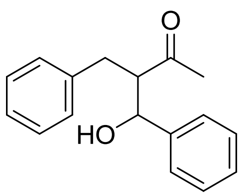


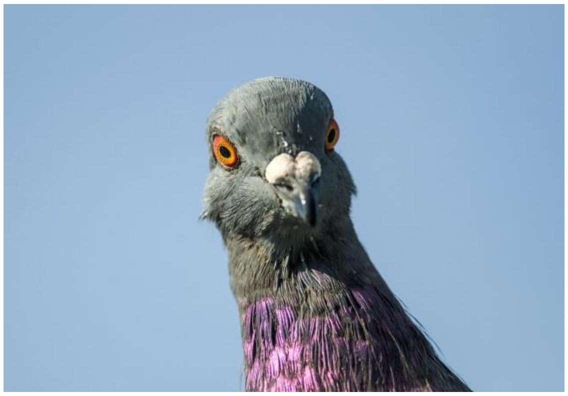
Diethyl malonate
(Malonic ester)

Target 1: (Target 2 is on the next page)

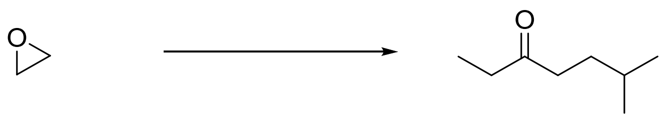


Target 2:





Extra credit. Extremely famous pigeon chemist Professor Burblecoo prefers doing reactions and syntheses that involve carboxylic acids (RCOOH; the pigeon likes the abbreviation and repeats it frequently) as well as reactions using organocuprates (the pigeon thinks these are organoCOOprates and mentions that to anyone who will listen). The professor tries to avoid decarboxylations (loss of COO).



Design a pigeon-friendly synthesis of 6-methyl-3-heptanone (a compound found in basil, melons, and potatoes) starting with oxirane, observing these conditions:

- At least one of your synthetic intermediates must be a carboxylic acid. (A synthetic intermediate is the product of a step in a multi-step synthesis.)

- You learned three reactions of organocuprates in lecture. You must use all three of these reactions in your synthesis. You do not have to use the same organocopper reagent each time.

Show the reagents needed for each step and the product of each step. Do not draw any mechanisms.