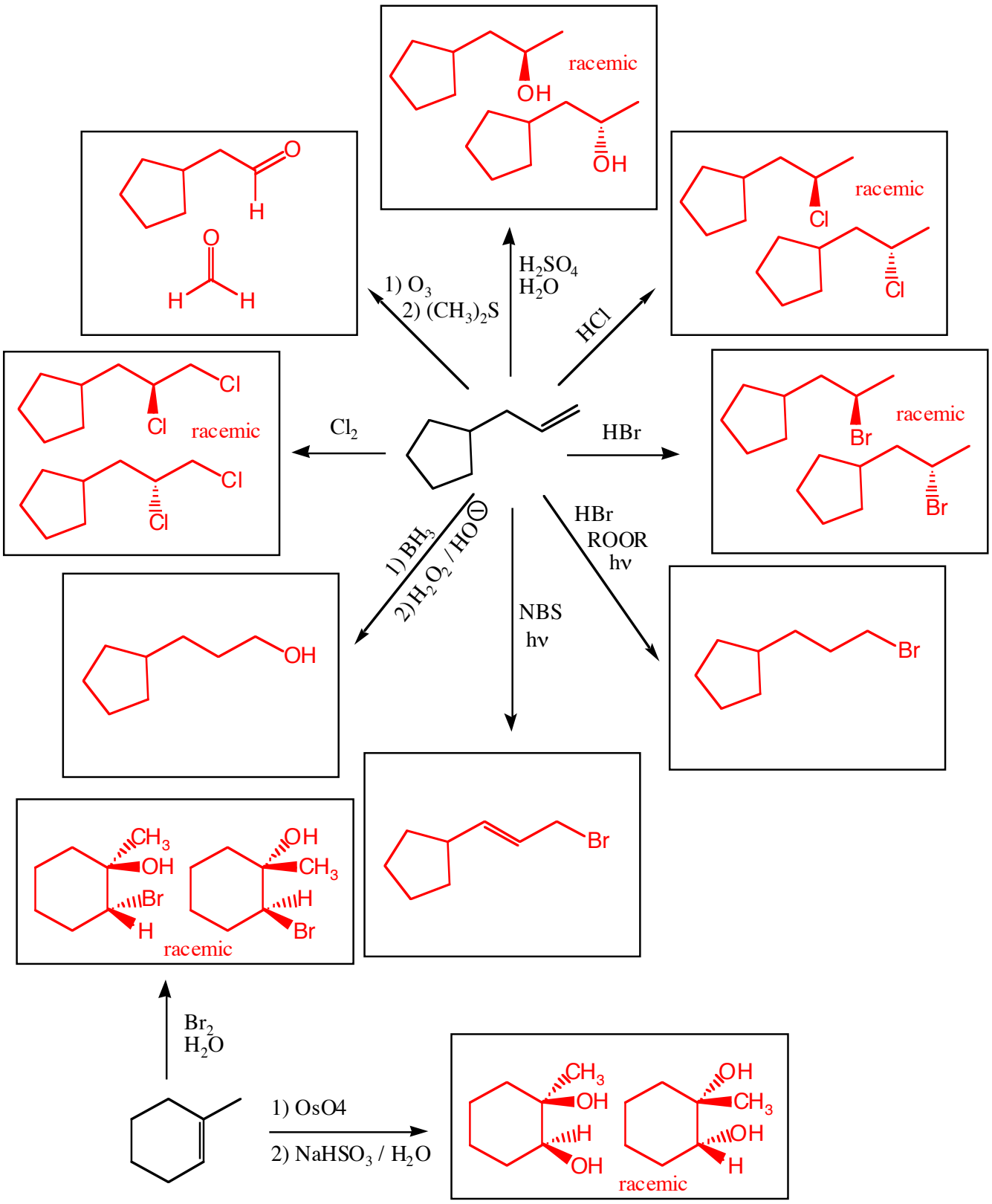
NAME (Print): _____

SIGNATURE: _____

Chemistry 320M/328M
Dr. Brent Iverson
Practice Homework
December 2, 2024

Please print the first three letters of your last name in the three boxes

Fill in the boxes with the structures that complete the reactions. Use wedges and dashes to indicate stereochemistry when appropriate.



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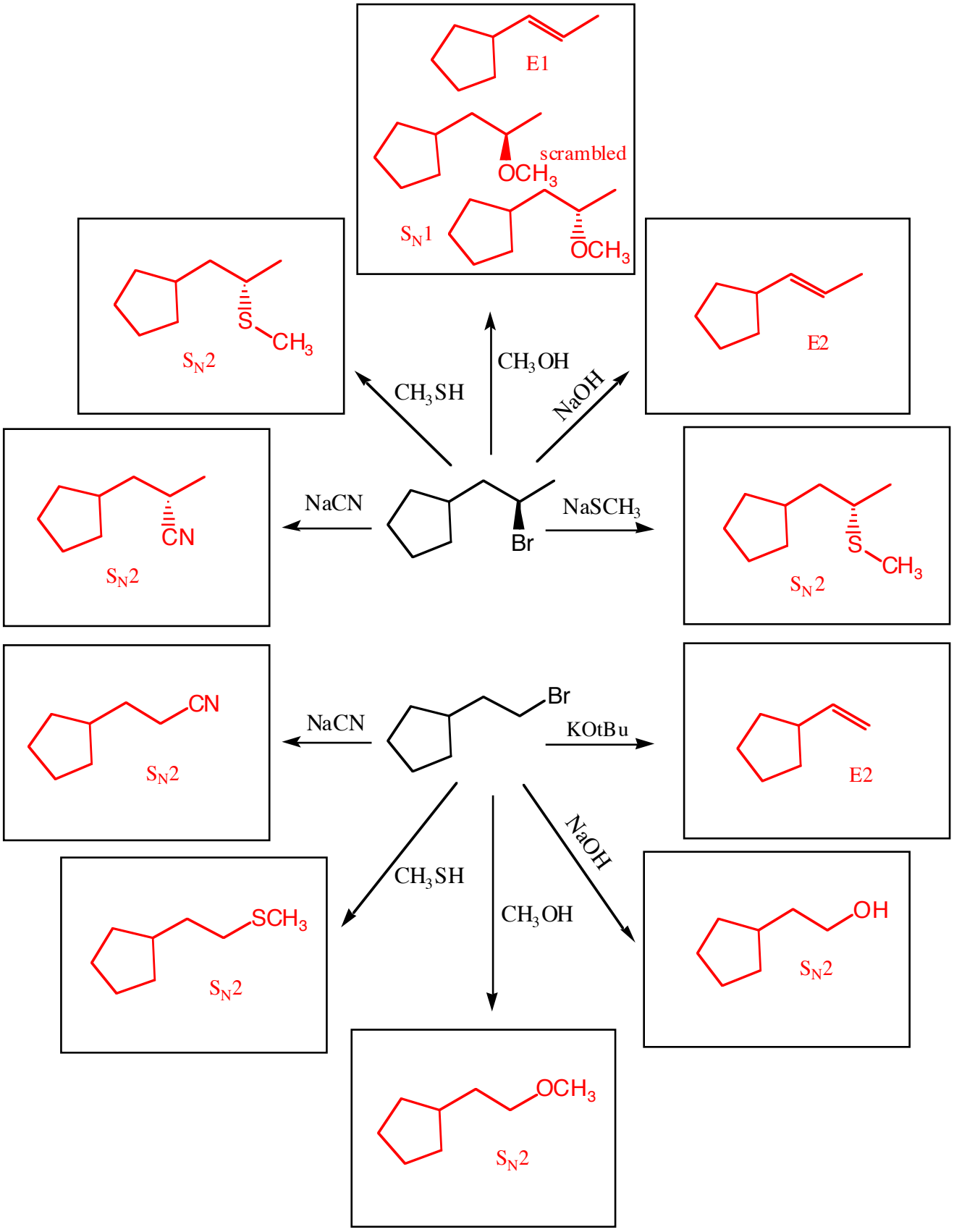

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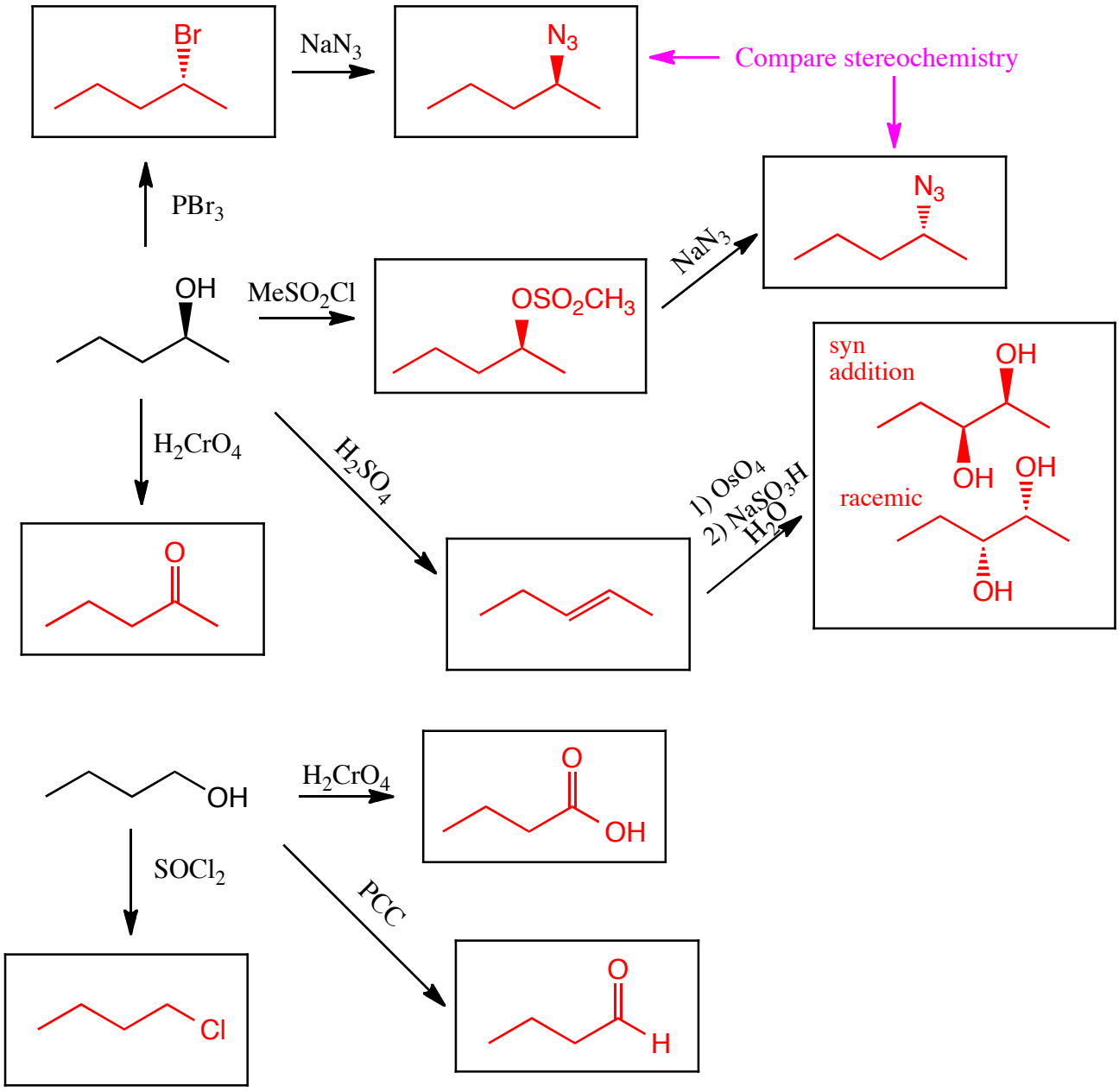

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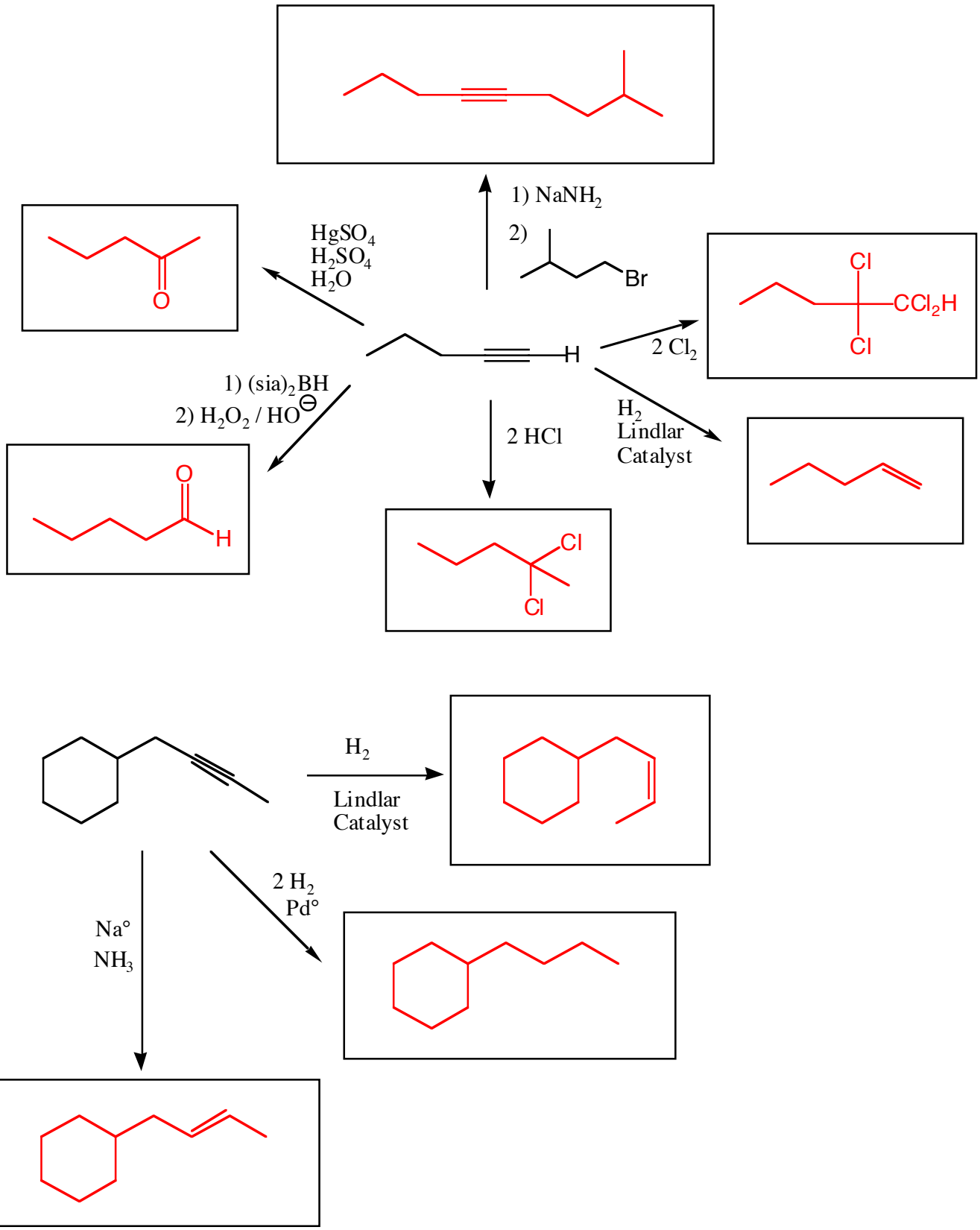

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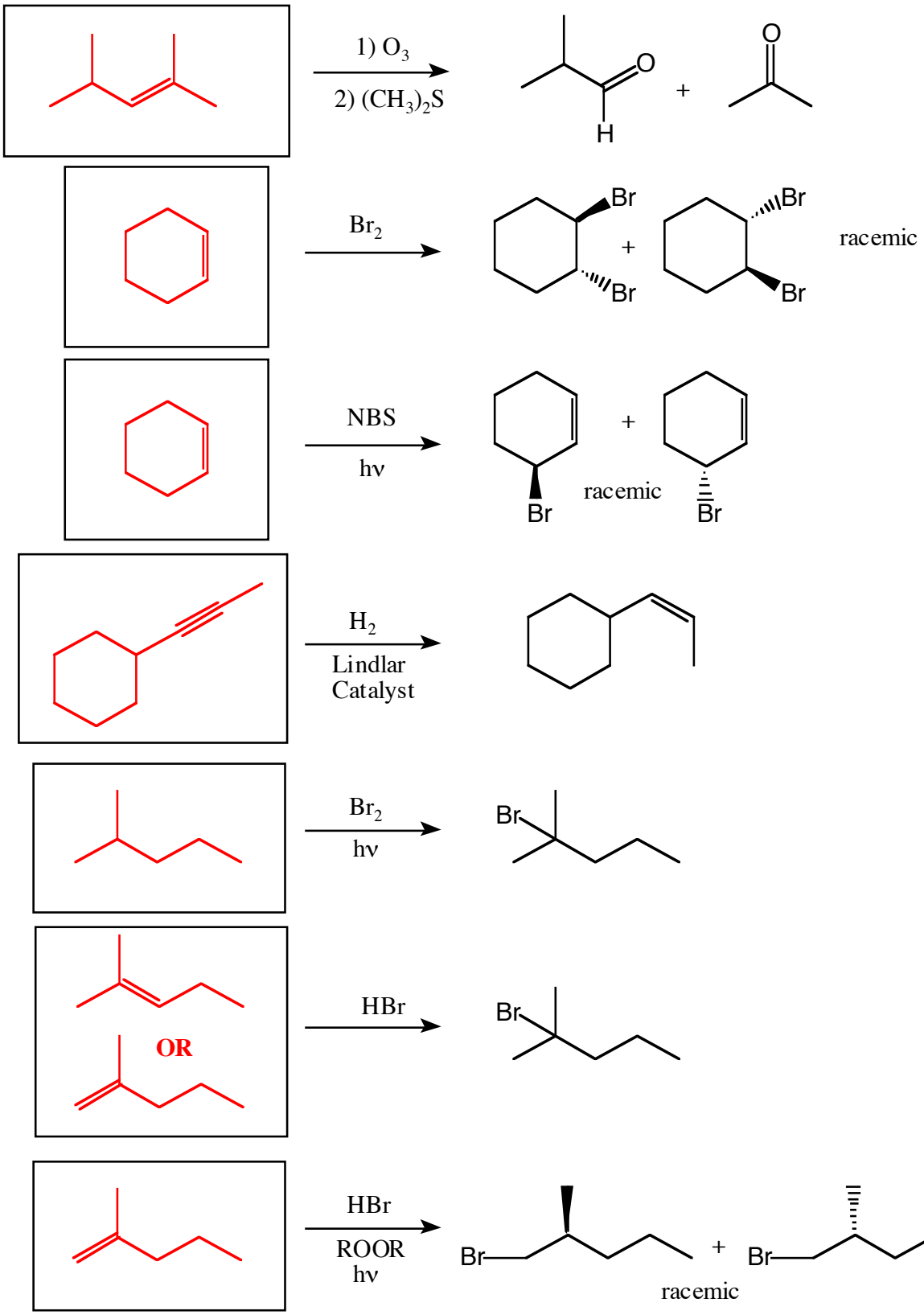

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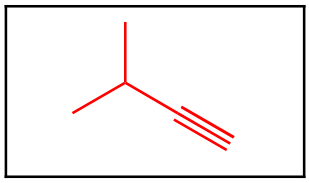
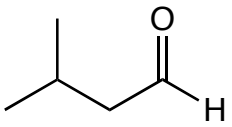
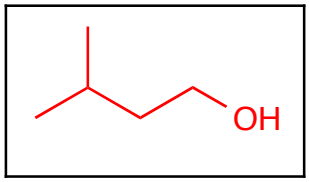


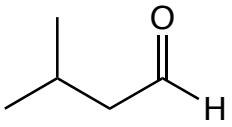
1) $(sia)_2BH$

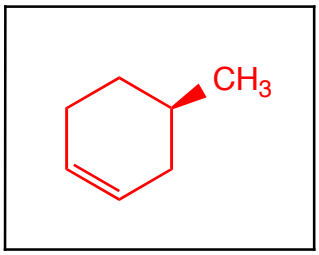
2) H_2O_2 / $HO^{\ominus}$





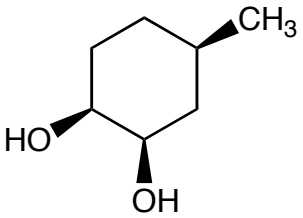
PCC

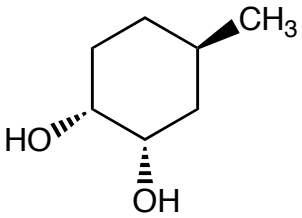


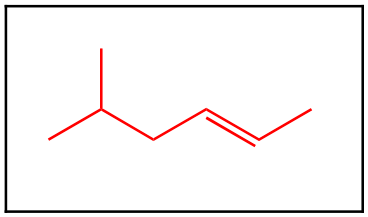


1) OsO4

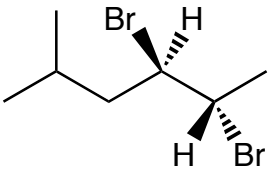
2) $NaHSO_3$ / H_2O



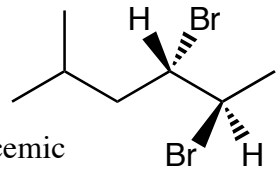


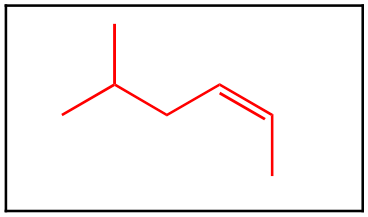


Br_2



racemic





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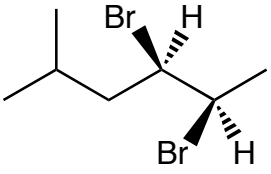

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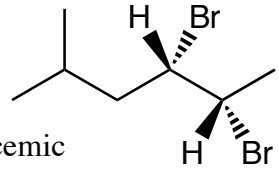
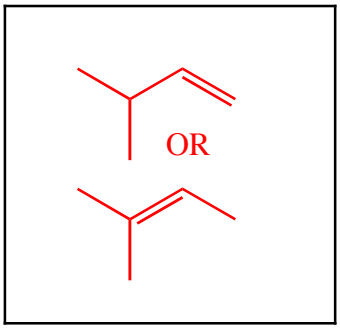
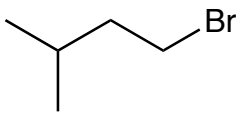


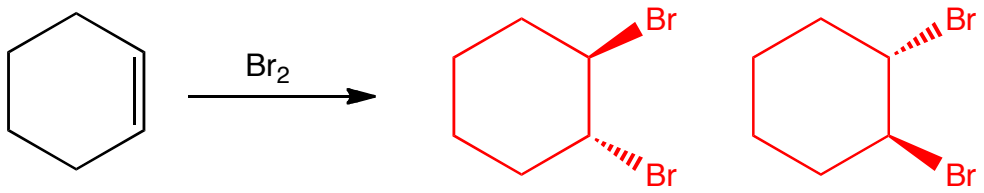


1) NBS / hν

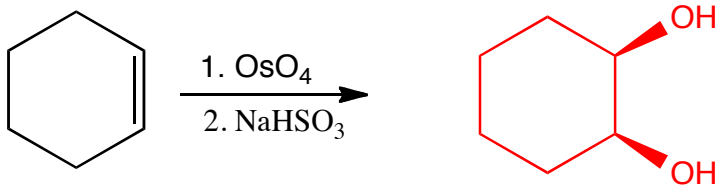
2) H_2 / Pt°

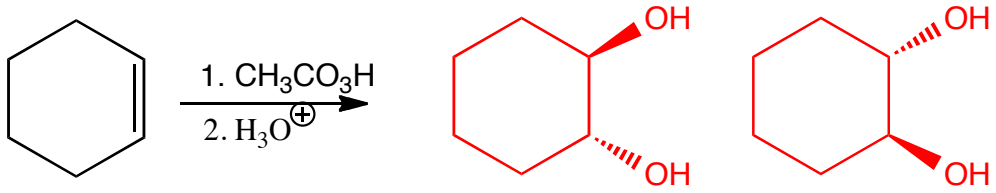


(3 or 5 pts each) Draw structures to complete the reactions. Use wedges and dashes to indicate stereochemistry and be sure to write racemic when appropriate.

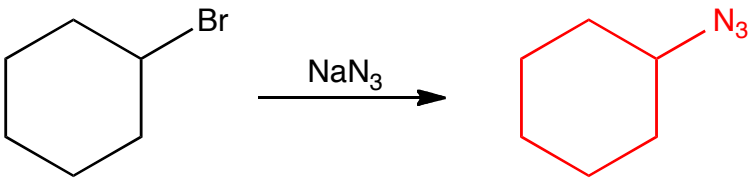


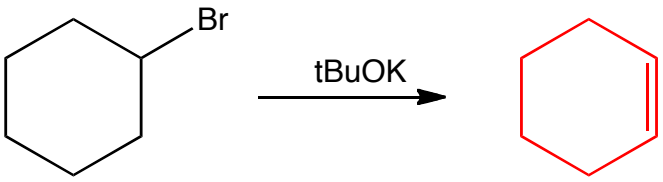
Racemic

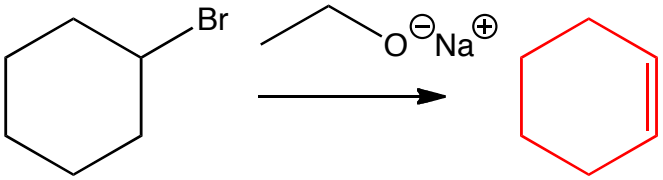


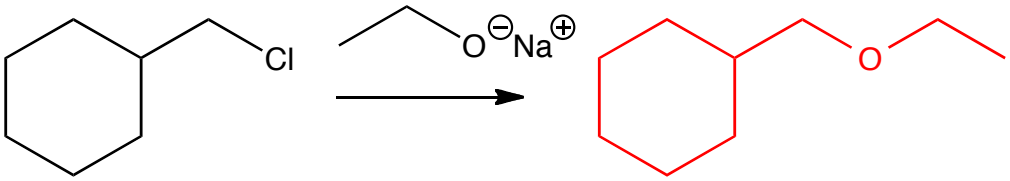


Racemic









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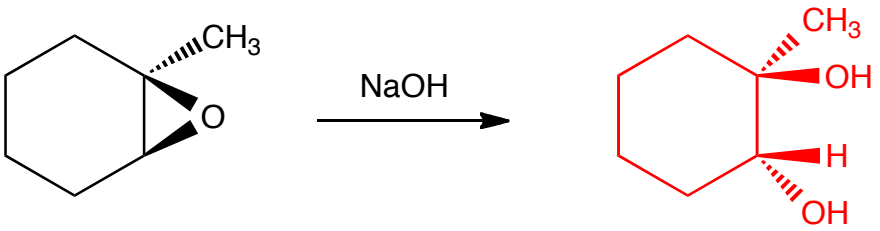

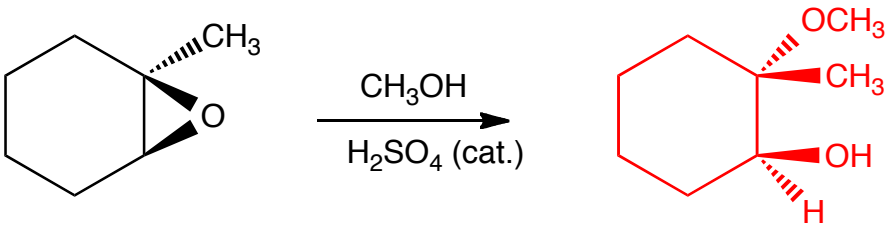

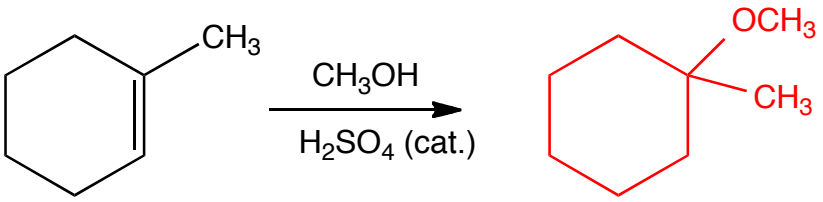

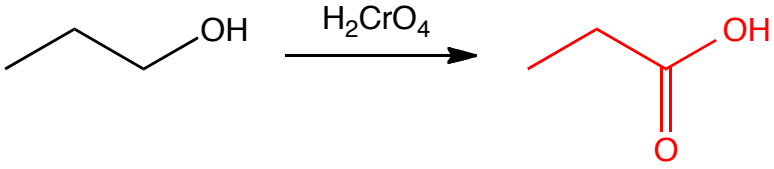

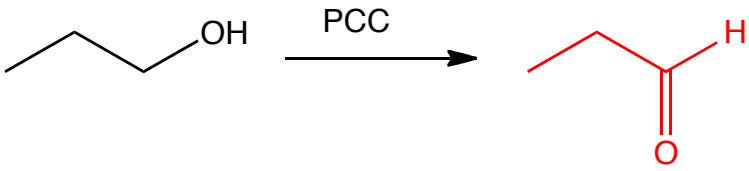

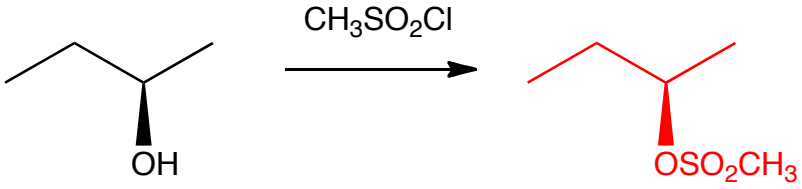

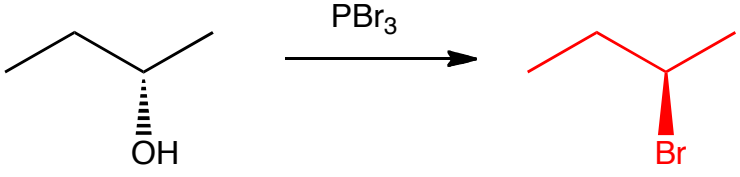

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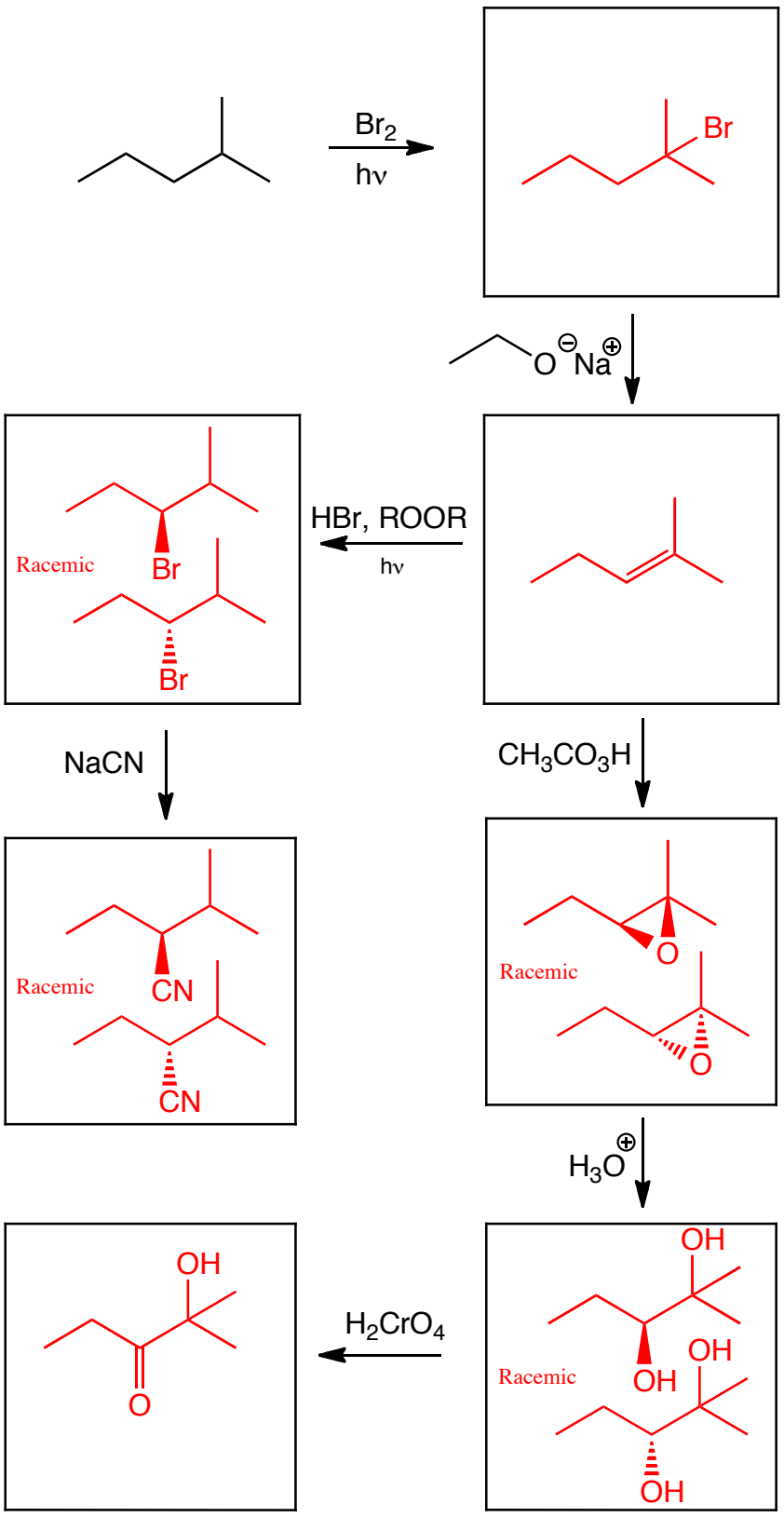

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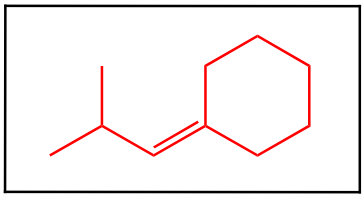
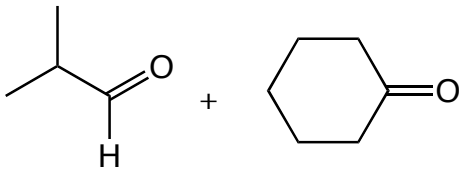
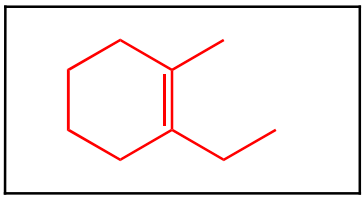


1) O_3
2) $(CH_3)_2S$





1) OsO4
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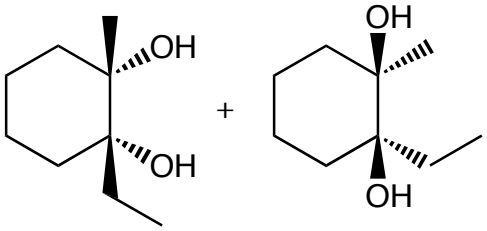
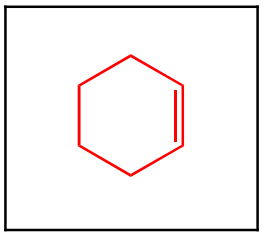
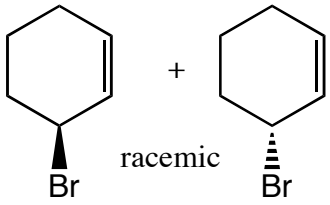
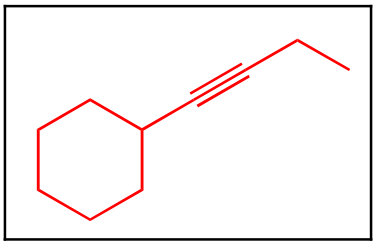


Racemic

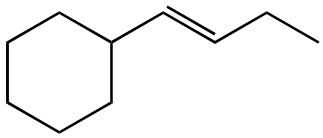


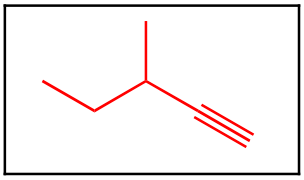
NBS
hν



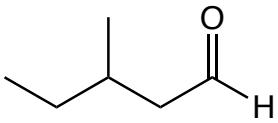


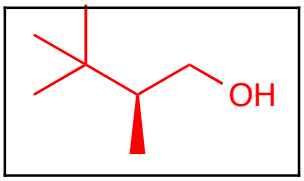
Na°
NH_3



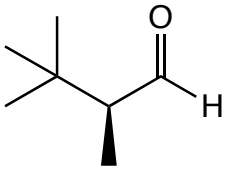


1) $(sia)_2BH$
2) H_2O_2 / $HO^{\ominus}$

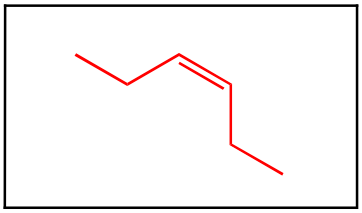




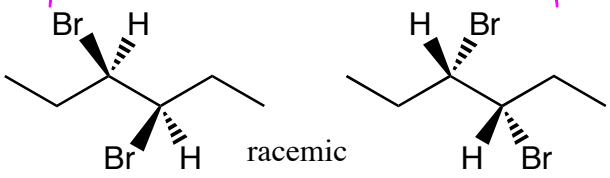
PCC



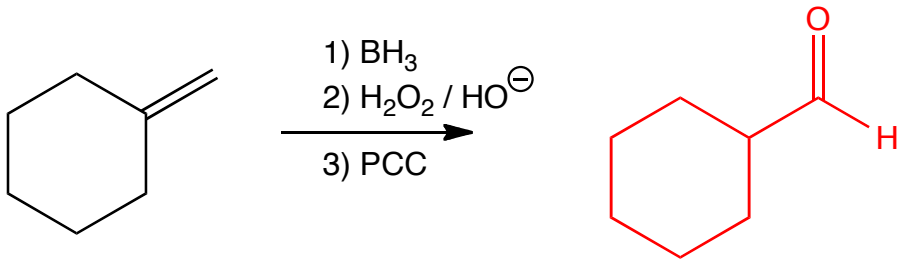
Note that you had to rotate the central bond because the product is drawn with the Br atoms syn, not anti.

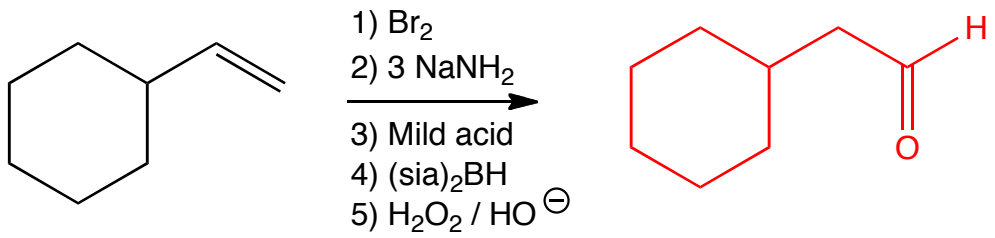


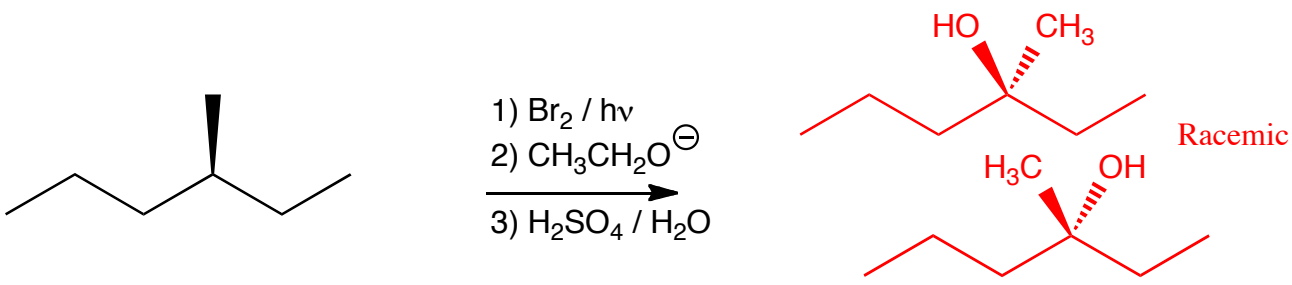
Br_2



(7-9 pts each) Draw structures for the product(s) of the following series of reactions. Use wedges and dashes to indicate stereochemistry when appropriate. This format is intended to get you more comfortable with working backwards in synthesis problems.



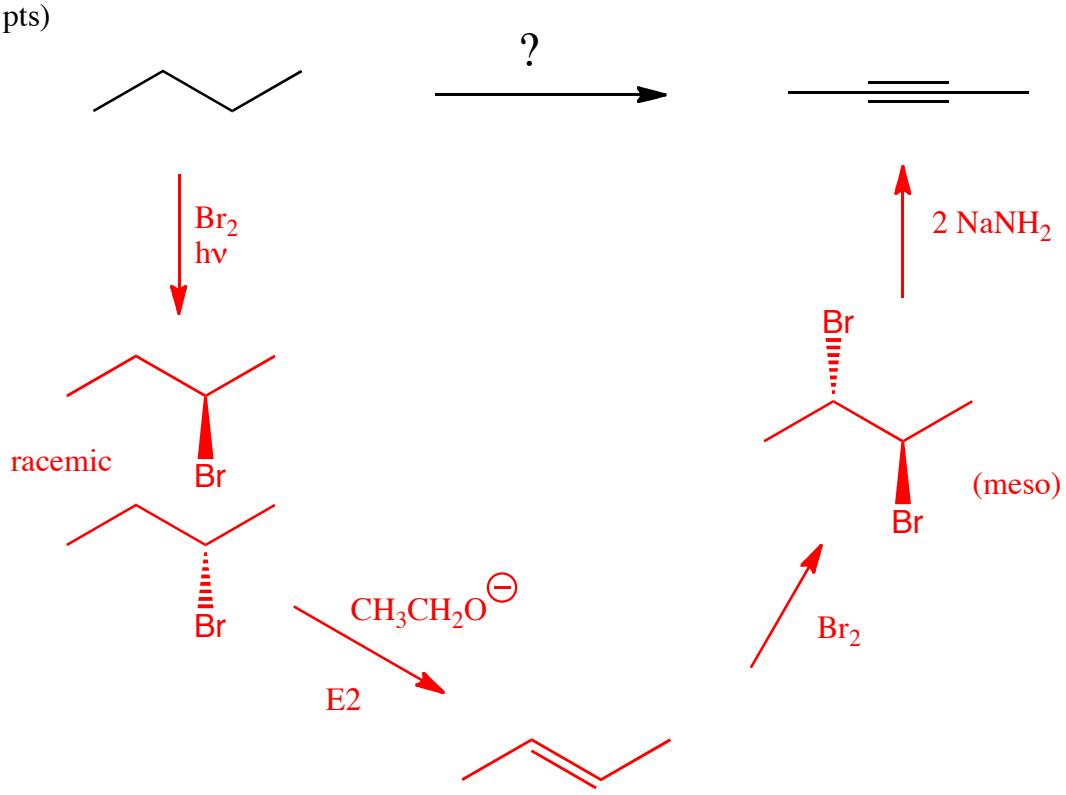




These are synthesis questions. You need to show how the starting material can be converted into the product(s) shown. You may use any reactions we have learned. Show all the reagents you need. Show each molecule synthesized along the way and be sure to pay attention to the regiochemistry and stereochemistry preferences for each reaction.

Remember, when doing synthesis problems you should 1) count carbon atoms in the product and starting material(s), 2) work backwards and 3) RECOGNIZE key features of a molecule that help you predict the reaction used to construct it.

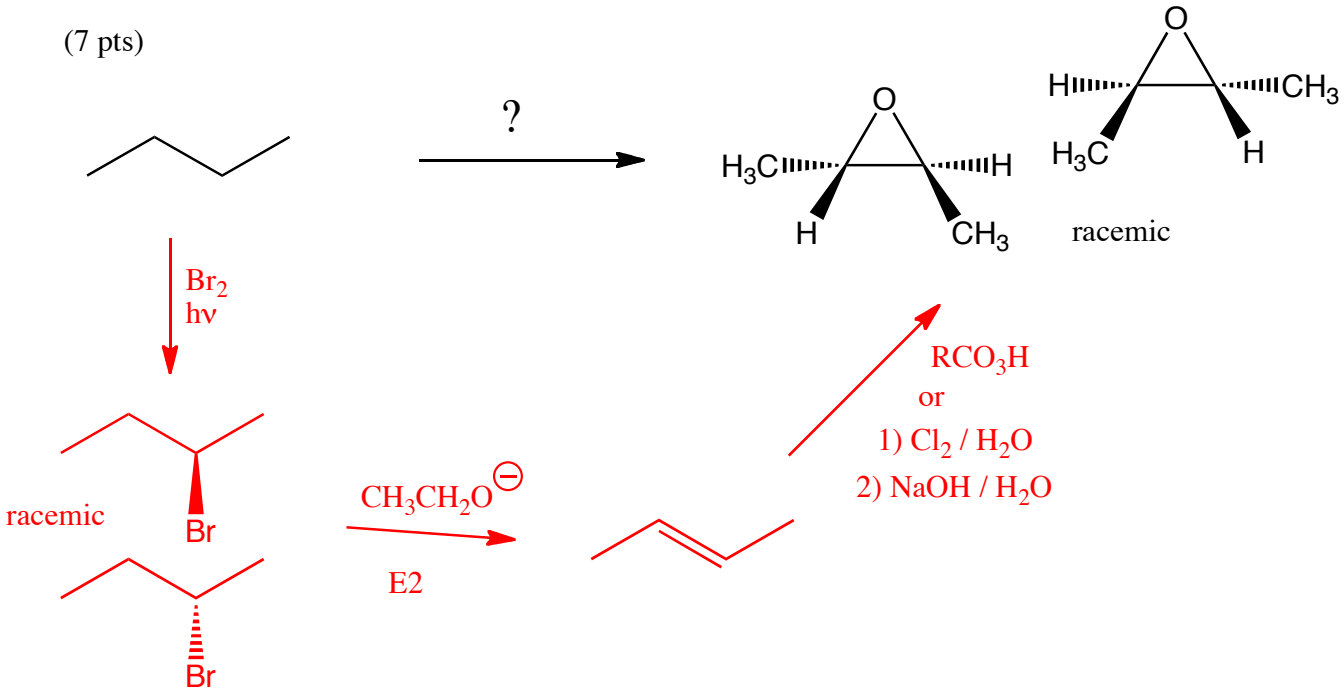
(10 pts)



This was a warm-up, and we wanted you to recognize this as being right down I-35 on the 310M roadmap!

You need to show how the starting material can be converted into the product(s) shown. You may use any reactions we have learned. Show all the reagents you need. Show each molecule synthesized along the way and be sure to pay attention to the regiochemistry and stereochemistry preferences for each reaction.

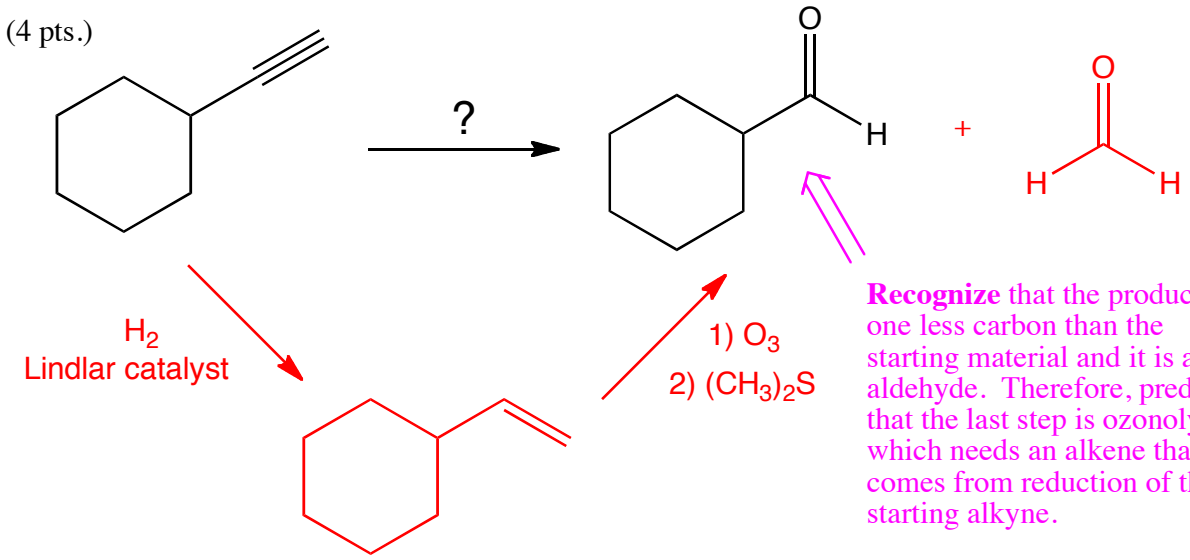
(7 pts)



This was very similar to the first one, we just wanted to remind you of the reagents (RCO_3H or 1) Cl_2/H_2O 2) $NaOH/H_2O$) that produce an epoxide from an alkene. Of these, the RCO_3H approach is much preferred by chemists because of its eash and generality.

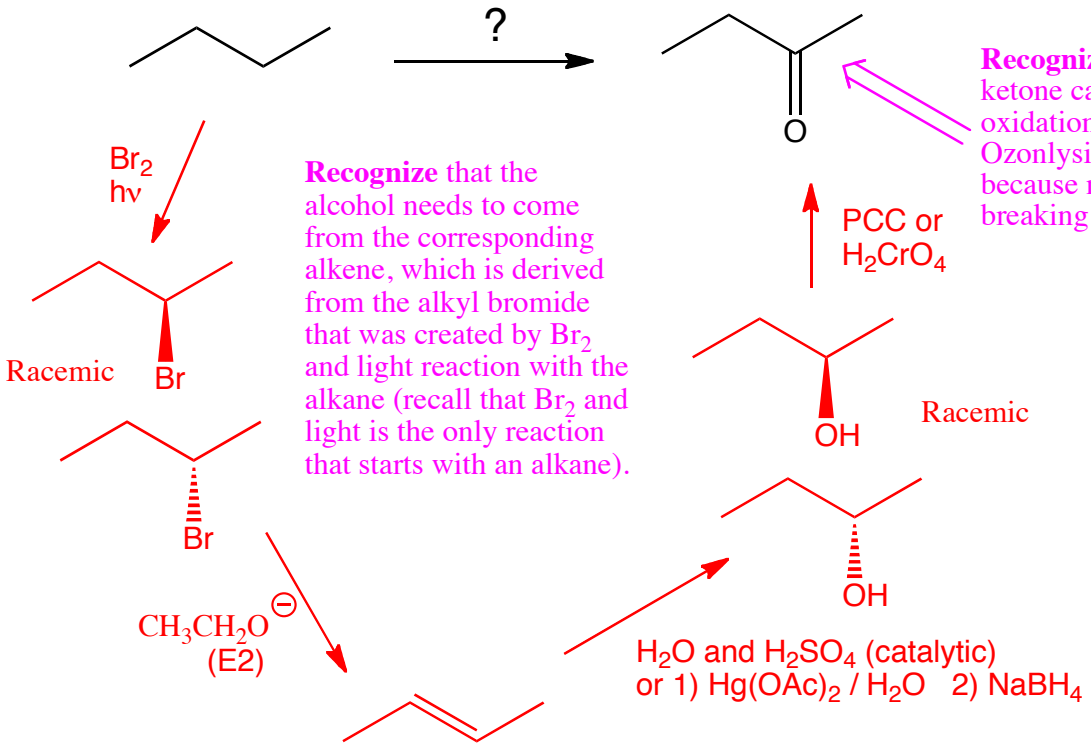
You need to show how the starting material can be converted into the product(s) shown. You may use any reactions we have learned. Show all the reagents you need. Show each molecule synthesized along the way and be sure to pay attention to the regiochemistry and stereochemistry preferences for each reaction.

(4 pts.)



Recognize that the product has one less carbon than the starting material and it is an aldehyde. Therefore, predict that the last step is ozonolysis, which needs an alkene that comes from reduction of the starting alkyne.

(9 pts.)



Recognize that the product ketone can only be made by oxidation of an alcohol. Ozonlysis is not relevant because no C-C bond breaking was involved.

Recognize that the alcohol needs to come from the corresponding alkene, which is derived from the alkyl bromide that was created by Br_2 and light reaction with the alkane (recall that Br_2 and light is the only reaction that starts with an alkane).

As a perfectly acceptable alternative stategy, you could make 2-butyne as described in the first part of this quesion on page 14, then create the ketone product using the mercury reagents or the borane approach.

You need to show how the starting material can be converted into the product(s) shown. You may use any reactions we have learned. Show all the reagents you need. Show each molecule synthesized along the way and be sure to pay attention to the regiochemistry and stereochemistry preferences for each reaction. All of the carbon atoms of the product must come from the starting material.

(21 pts)