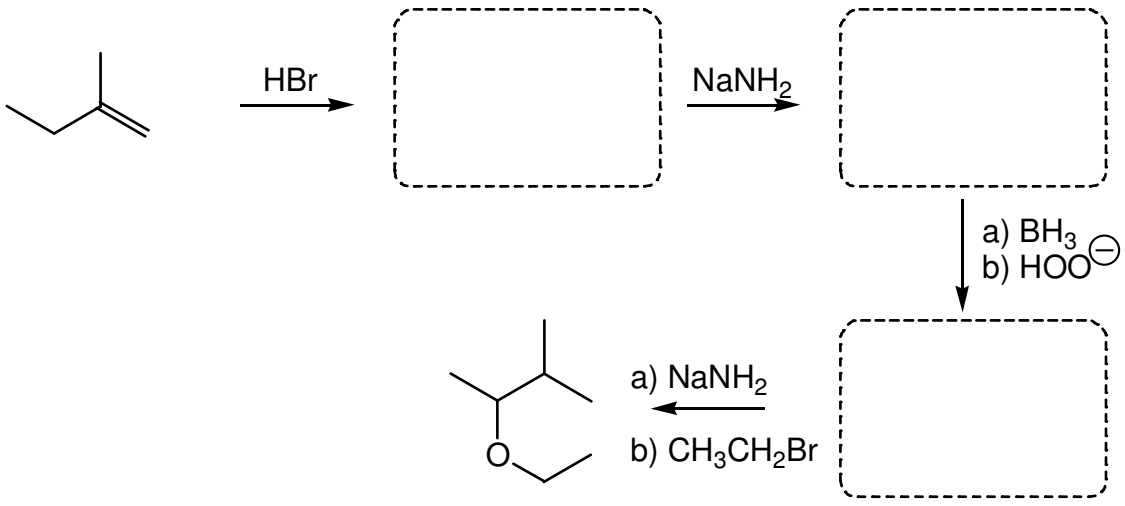
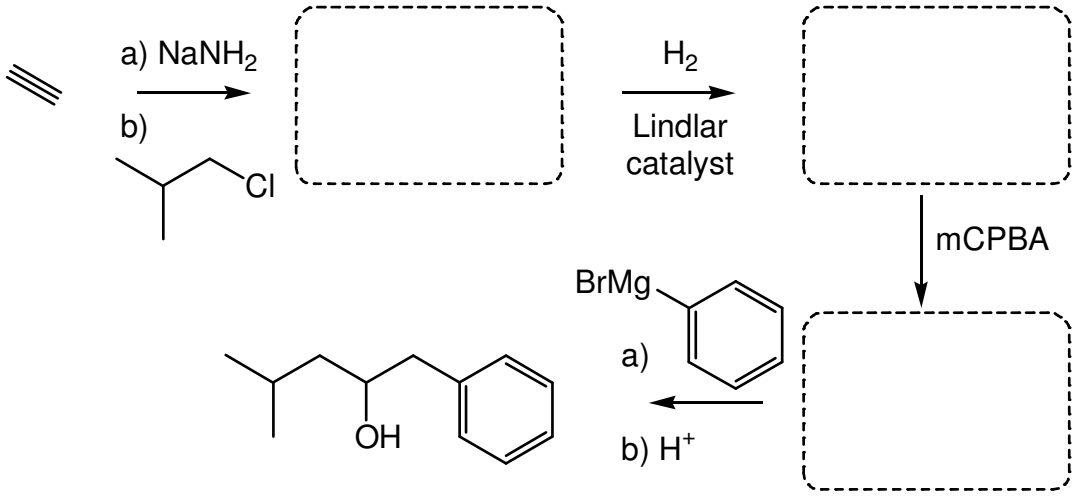
Sample exam 2

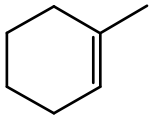
1. This is a "multi-step synthesis". That is, the product of the first reaction becomes the starting material for the next, and so forth, so that a more complex compound is built up in steps from the initial starting material. Fill in the compounds for each step along this path in the boxes.



2. Here is another multi-step synthesis. Again, fill in the compounds for each step along this path in the boxes.

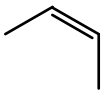


3. Predict the major organic product or products for each of the following. Indicate stereochemistry where appropriate. "No reaction" may be a valid answer.



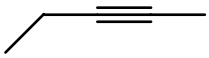
a) BH_3

b) $NaOH$, H_2O_2



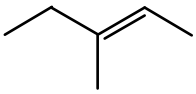
CH_2N_2

heat

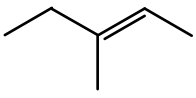


Li

$NH_{3(l)}$



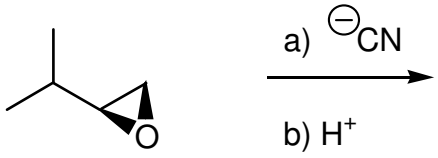
Br_2, H_2O

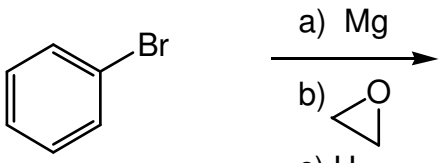


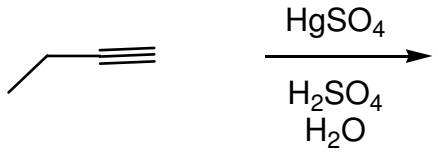
a) $Hg(OAc)_2$, H_2O

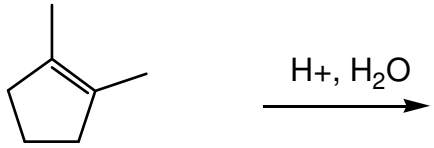
b) $NaBH_4$

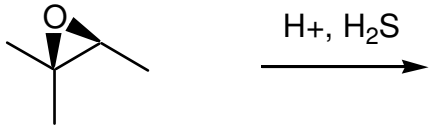
4. Predict the major organic product or products for each of the following. Indicate stereochemistry where appropriate. "No reaction" may be a valid answer.



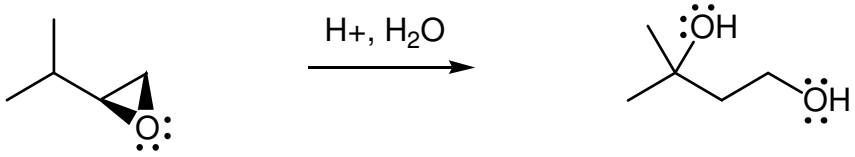




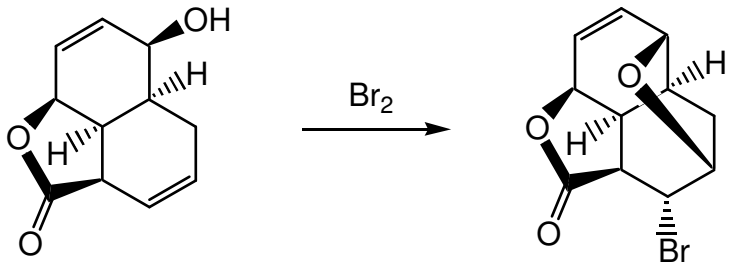




5. Suggest a mechanism for this transformation.



6. a) Suggest a mechanism for this transformation.



b) Bonus hard question. In the above reaction, only one stereoisomer is formed. Explain. Hint: Build a model of the starting material first.

Sample exam 2

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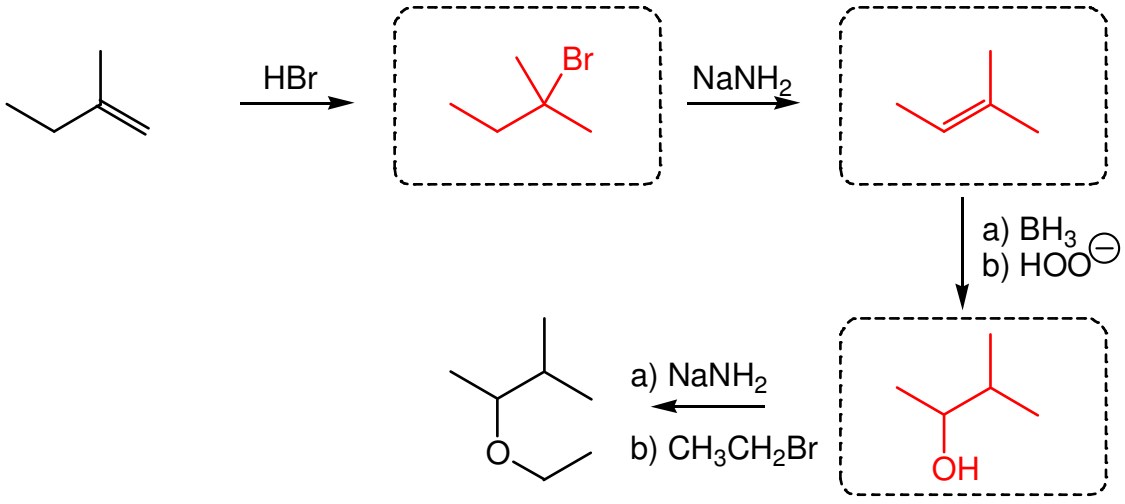
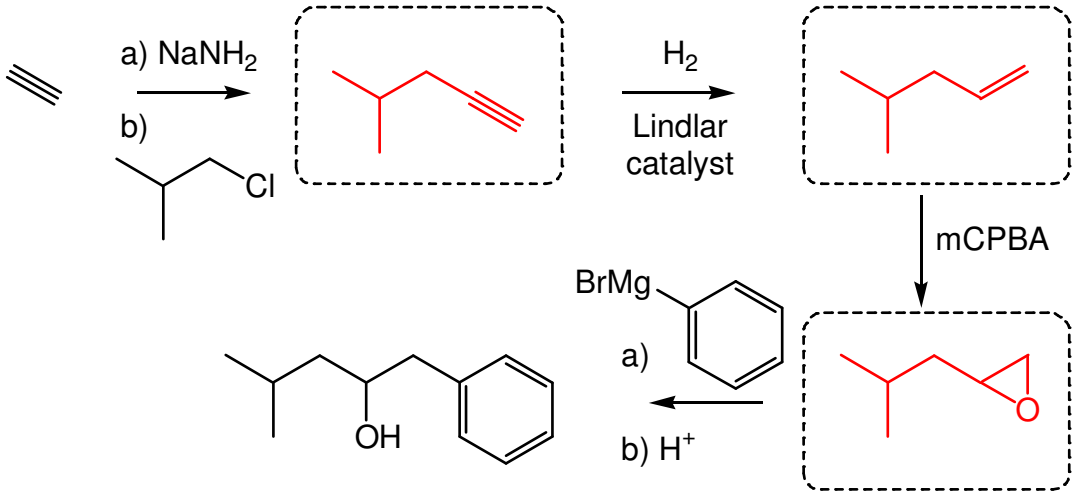
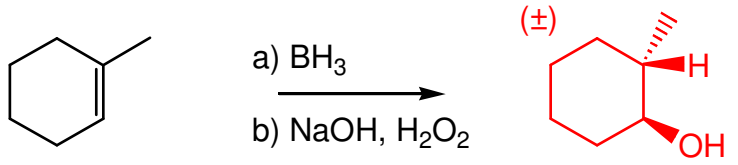
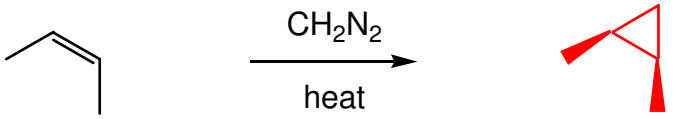


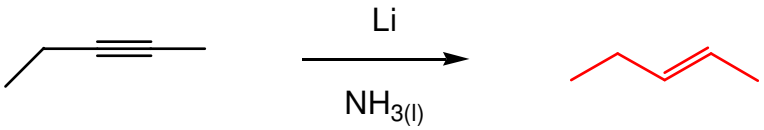
2. Here is another multi-step synthesis. Again, fill in the compounds for each step along this path in the boxes.

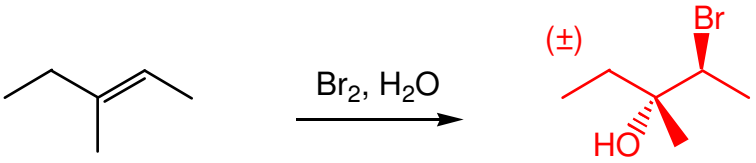


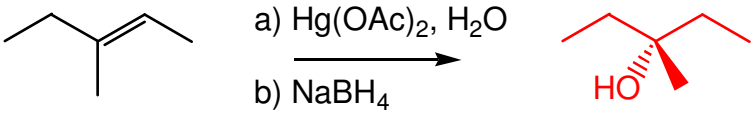
3. Predict the major organic product or products for each of the following. Indicate stereochemistry where appropriate. "No reaction" may be a valid answer.



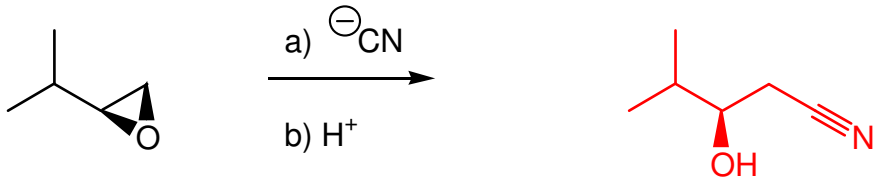


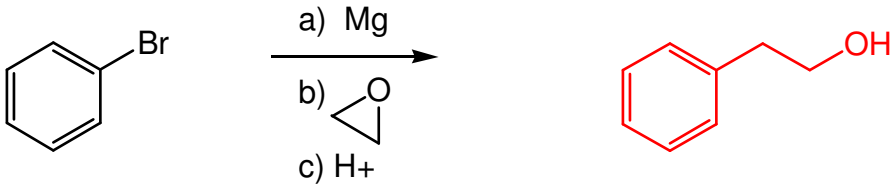


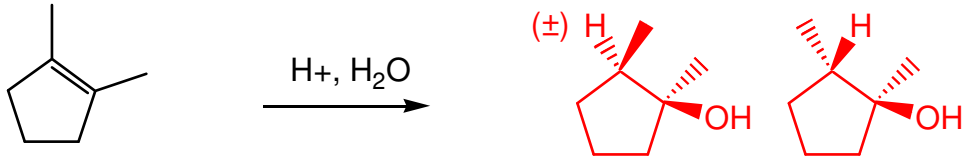


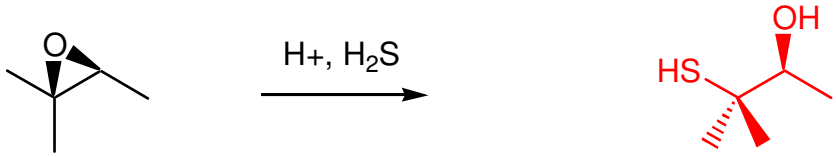


4. Predict the major organic product or products for each of the following. Indicate stereochemistry where appropriate. "No reaction" may be a valid answer.

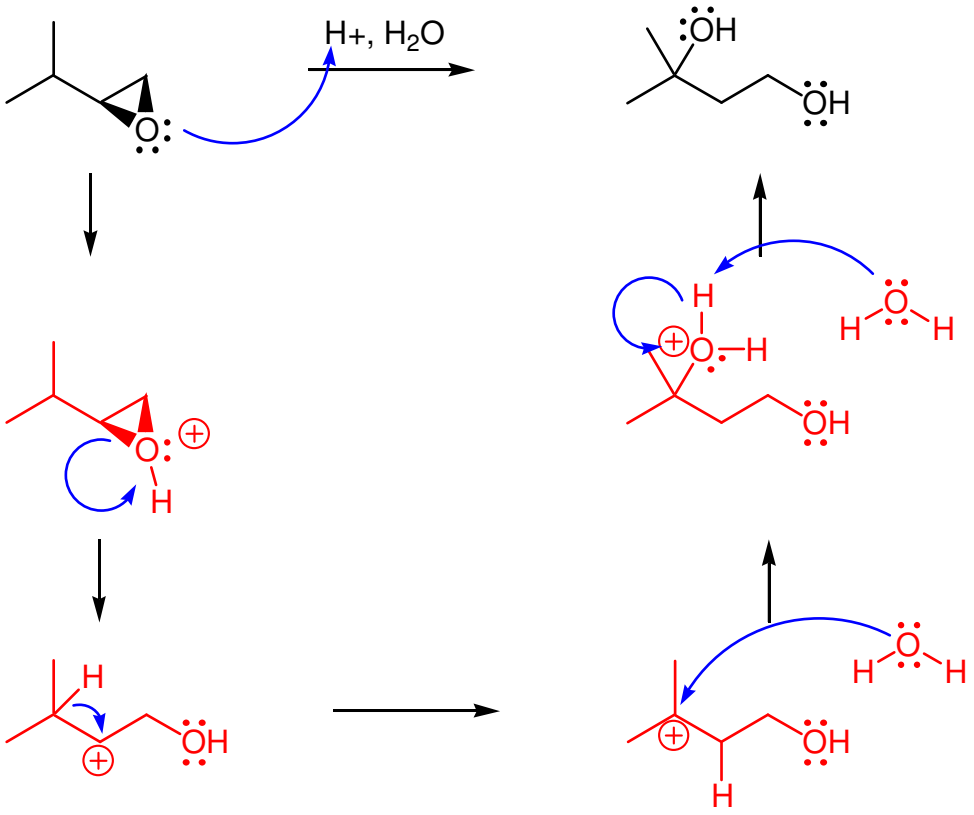








5. Suggest a mechanism for this transformation.



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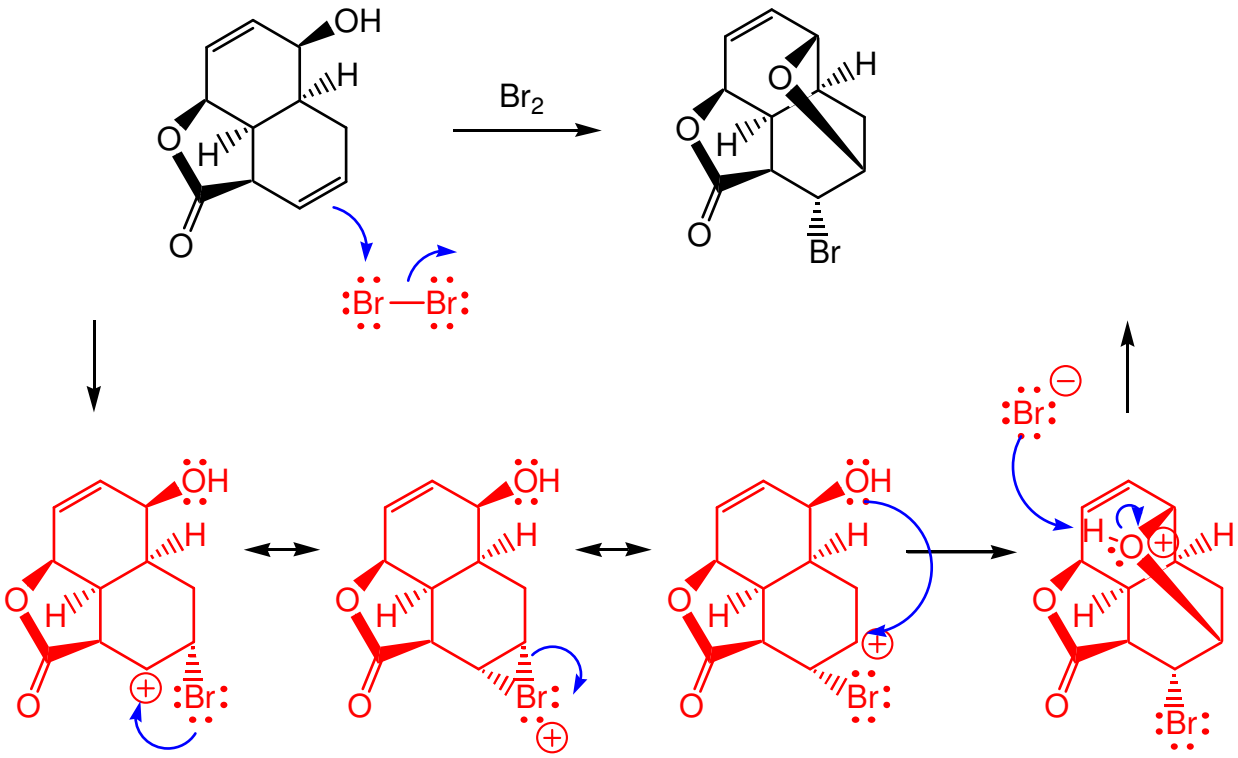
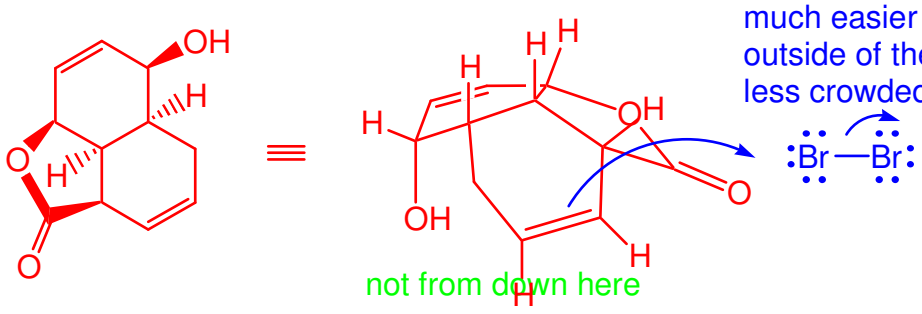


b) Bonus hard question. In the above reaction, only one stereoisomer is formed. Explain. Hint: Build a model of the starting material first.

If you build a model of the starting material, you will see that it is cup-shaped, as I've shown below.

When bromine approaches, it is much easier to come from the outside of the bowl shape, as it is less crowded there.



Since the bromine comes from one side, the oxygen comes from the opposite side (*anti* addition).