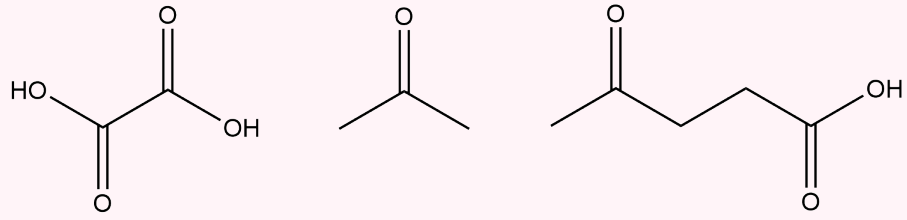
Not a Bed of Roses

Elementary Problem 2 - 10 points

Deadline: 8:30 PM IST, 21^{st} August

Rose oil is an essential oil obtained by distillation of roses. It has antibacterial and antifungal properties. One of its components **A** belongs to a class of compounds called terpenes and has a molecular formula $C_{10}H_{18}O$. Upon oxidation, **A** can give either a ten-carbon aldehyde or a ten-carbon carboxylic acid. **A** reacts with bromine under appropriate conditions to give tetrabromide **B**. **A** reacts with Hydrobromic acid, under appropriate conditions, to give two bromides of formula $C_{10}H_{17}Br$. When **A** undergoes ozonolysis, three products are formed:

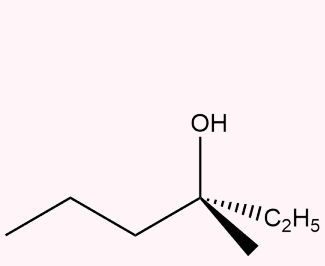


a) Give the structures of A, B and the two bromides formed when A reacts with HBr.

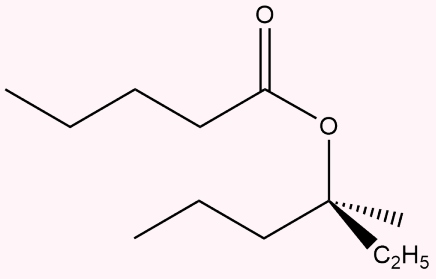
b) Which of the two bromides is do you expect to be formed in a higher proportion?

c) Draw the structures of the isoprene units that constitute A.

Taking great pains, you have managed to separate the three ozonolysis products (given above) of **A**. Using any or all of these products along with compound **D**, your guide asks you prepare near-quantitatively the molecule **E**.



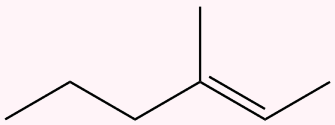
D



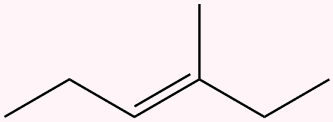
E

d) Devise a short scheme (not exceeding 4 steps) to synthesize E. Show mechanisms for non-trivial transformations.

You have now been instructed to perform a dehydration of **D**. You have managed to obtain and somehow isolate two pure alkenes **F** and **G**.



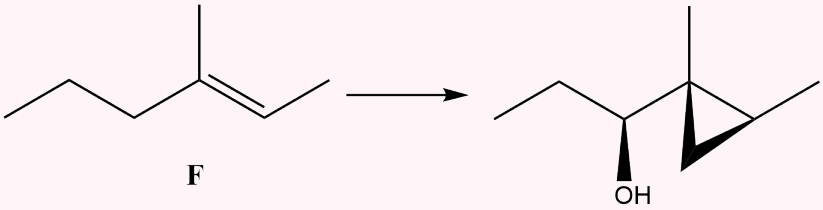
F



G

Arbitrarily, we choose **F**.

e) Perform the following conversion:



F

You can use normal resolution methods to resolve the enantiomers during synthesis if you so desire. Try to make the synthesis scheme as efficient as possible. Provide necessary details and show the mechanism for the transformation. Justify that your synthesis scheme produces the desired compound using the mechanism outlined by you.