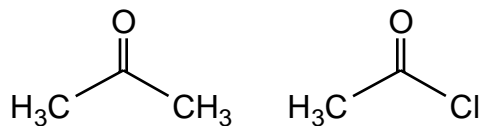


Relevant Questions from 1998

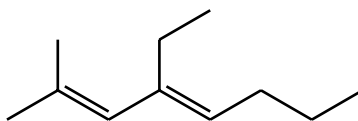
3. (4 minutes) A tiny amount of acid (say one part in 10^5) can change the NMR spectrum of CH_3OH dramatically, while it has no noticeable effect on the IR spectrum of the same alcohol. Explain this difference.
4. (4 minutes) How would you use IR spectra to distinguish most easily between the following compounds? Say as specifically as possible what you would expect to see.



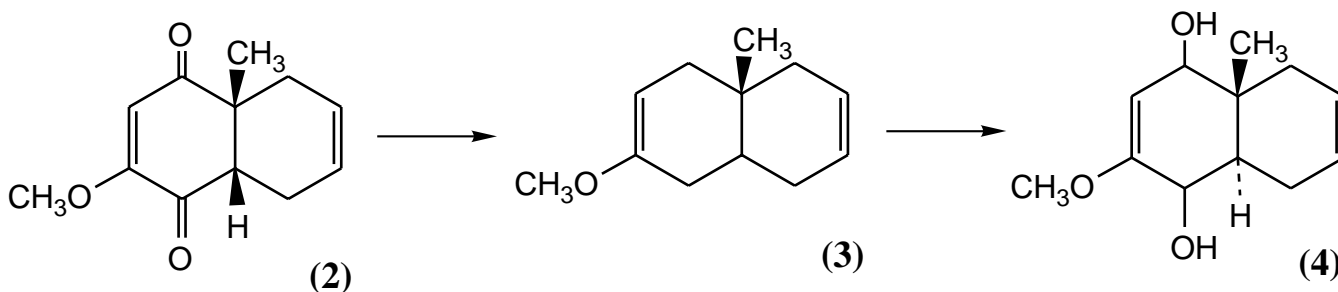
5. (4 minutes) Insert appropriate reagent(s) above each of the following arrows.



6. (8 minutes) Suggest a high-yield synthesis of the following compound from materials with four or fewer carbons. (Do not worry about E/Z isomers)

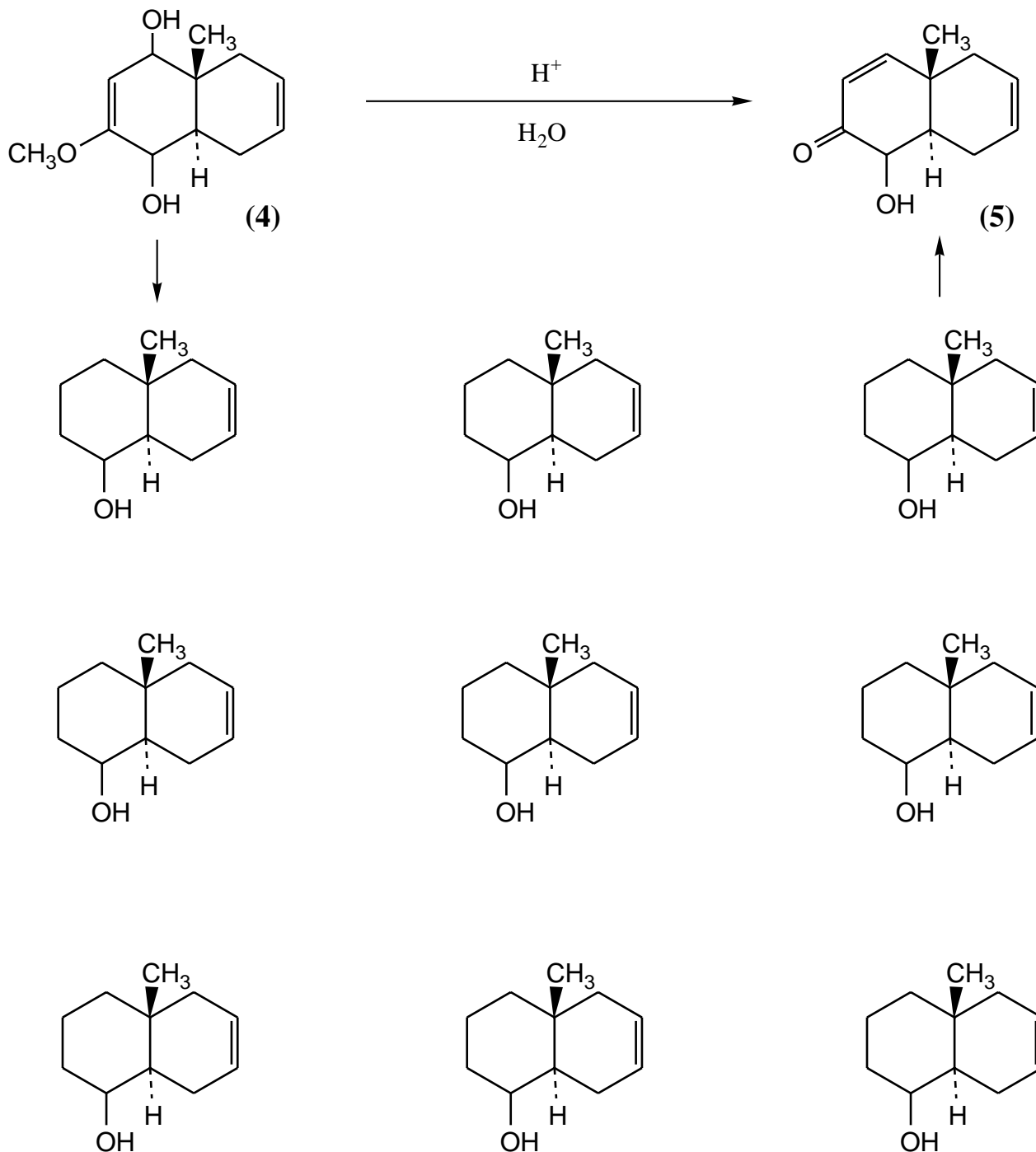


7. (4 minutes) Early in his Cortisone synthesis Woodward converted Compound 2 into Compound 4 by successive treatment with two reagents. **Complete** the structure of **Compound 3**, and **draw** the appropriate **reagent** above each arrow. (**Note the stereochemistry**. No mechanisms necessary)



8. (10 minutes) Woodward next prepared α,β -unsaturated ketone **5** by treating **4** with acid and water. **Complete the partial structures** below with necessary atoms, bonds, and arrows (curved, straight, double-headed) to **show every bonding change** involved in this conversion. Draw **only ONE curved arrow in each structure**. You may wish to use some structures to show resonance.

[You should not need all of the partial structures.]



9. (4 min) Draw the structure of a compound *with just one ring* that might give Compound **5** upon treatment with base. (You need not draw the mechanism, just the structure of the precursor.)