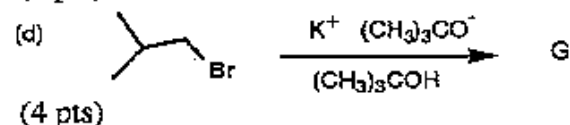
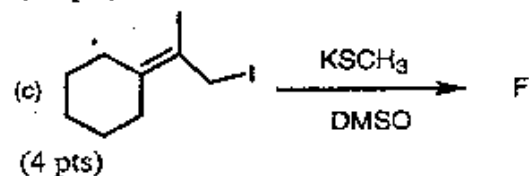
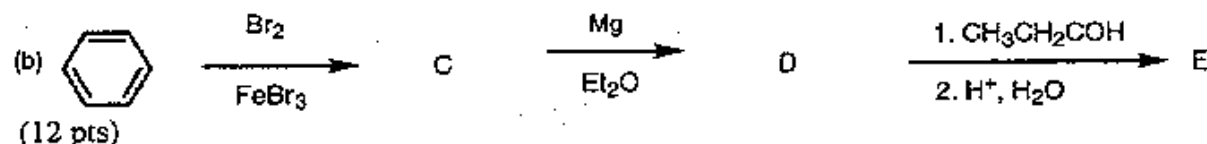
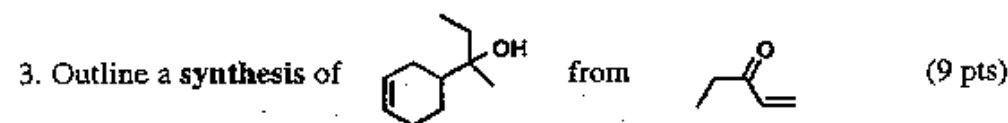


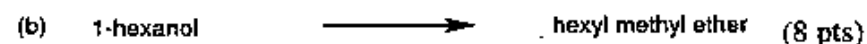
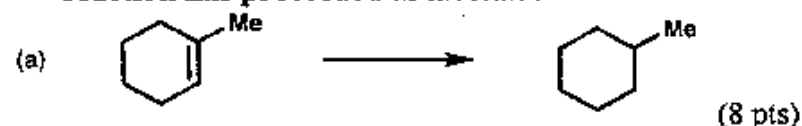
1. Complete each of the following reactions by giving the principal organic product formed in each case.



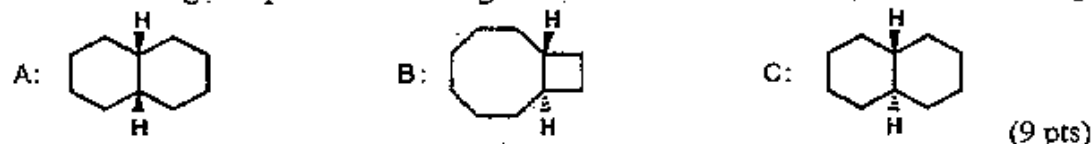
2. Draw the structure of (R)-4-deuterio-2-hexyne. (4 pts) Propose a suitable retro-S_N2 precursor (a chiral haloalkane) of this compound. (4 pts)



4. Indicate how you would carry out each of the following chemical transformations. What are some of the changes in the infrared spectrum that could be used to indicate whether the reaction has proceeded as indicated?

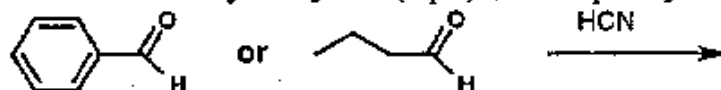


5. Rank the following compounds according to their heats of formation, lowest first. Explain.



6. Explain why an optically inactive product is obtained when (R)-3-methyl-1-pentene undergoes catalytic hydrogenation. (8 pts)

7. Which carbonyl compound should form the greater proportion of cyanohydrin at equilibrium? (4 pts) Draw the structure of the cyanohydrin (4 pts), and explain your reasoning. (4 pts)



8. Complete the following reaction by giving the principal organic product. Explain how you arrived at your answer, using curved-arrow formalism where possible. (10 pts)

