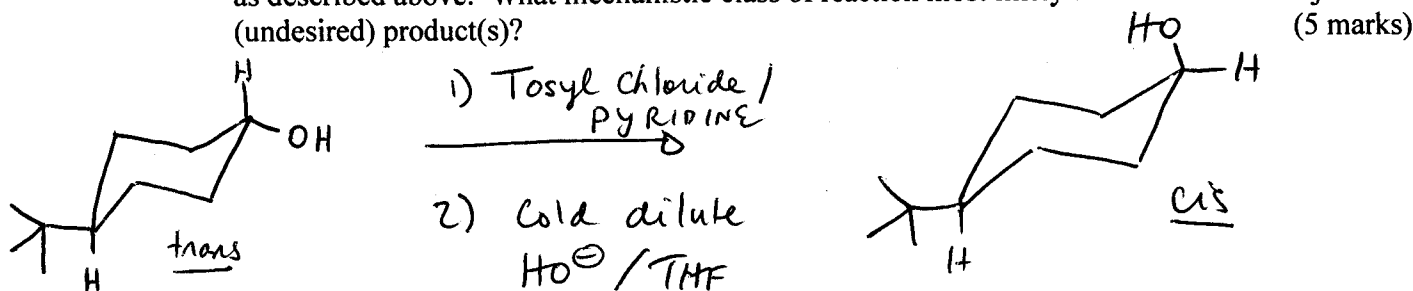


1. Attempts to prepare *cis*-4-*tert*-butylcyclohexanol from its *trans* isomer via tosylation and subsequent S_N2 inversion with cold, dilute hydroxide failed to give satisfactory yields under a broad range of different solvent and temperature conditions.

a) Write the chemical reactions (not mechanisms!) that correspond to a typical failed reaction as described above. What mechanistic class of reaction most likely accounts for the major (undesired) product(s)? (5 marks)



S_N1 accounts for the undesired alcohol (*trans*)

$E1/E2$ most likely accounts for the undesired alkenes.

b) Subsequent attempts with a wide variety of leaving groups also failed, and the "direct S_N2 " approach was abandoned. Propose an alternate approach for the preparation of *cis*-4-*tert*-butylcyclohexanol, still using its *trans* isomer as the starting material and using any other reagents of 2 carbons or less, and any inorganic reagents and solvents. Steps that lose 50% of the yield (or more) are unacceptable. (5 marks)

