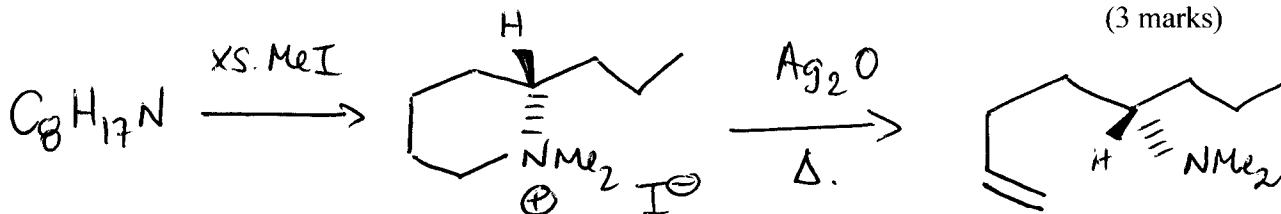


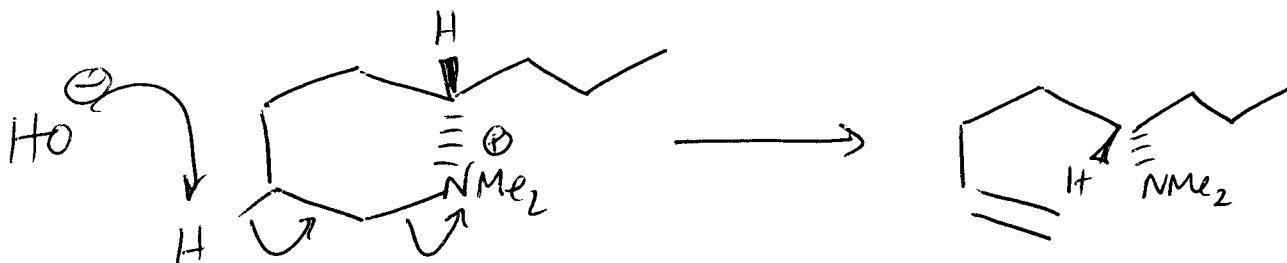
2. In 399 B.C., a condemned Socrates drank a toxic infusion of hemlock, a plant commonly found in Europe and Asia. Modern toxicological studies to determine the poison first begin with an identification of the main components of the plant.

One chemical isolated and purified from hemlock has a molecular formula of $C_8H_{17}N$ as determined by mass spectrometry. Treatment with excess methyl iodide, followed by silver (I) oxide and heating, gives pure (*S*)-5-*N,N*-dimethylamino-oct-1-ene.

a) Write out the chemical reactions that correspond to the above. Mechanisms are not required. (3 marks)



b) Give the mechanism for the reaction that occurs during the final heating step. Show all electron movement with curly arrows, and explicitly label all charges on all atoms. (5 marks)



c) Propose a structure for the unknown. (2 marks)

