Spivey Group Problem Session
Total Synthesis of (+)-Isatisine A
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Roots and leaves of the plant *Isatis indigotica* Fort. (Cruciferae), found in China and East Asia, were used traditionally to treat viral diseases. Chen *et al.* in 2007 isolated the alkaloid isatisine A from *Isatis indigotica* and in 2010 Kerr *et al.* reported the first total synthesis of (-)-isatisine A. Recently Lee and Panek reported the total synthesis of (+)-isatisine A, via the formation of a highly substituted tetrahydrofuran using a silyl-directed Mukaiyama-type [3+2]-annulation approach.

The overall reaction scheme for the synthesis of (+)-isatisine A is shown below. Please suggest reagents, conditions, mechanisms and products where indicated.