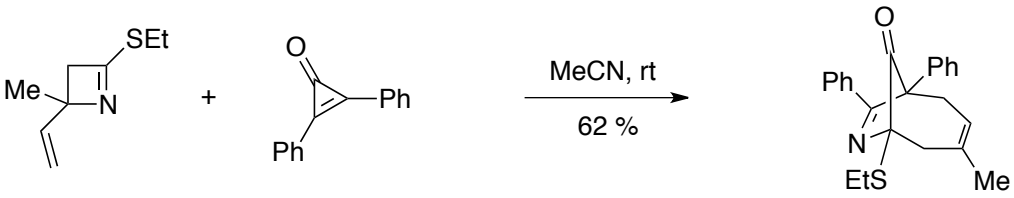
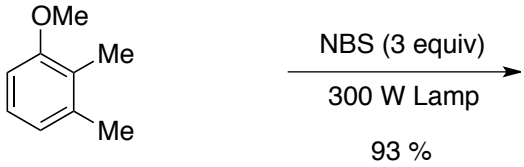
Q1. Propose a mechanism for the following rearrangement.



Tetrahedron Letters, 2006 , vol. 47, # 4 p. 425 - 428

Q2. Identify the correct product regioisomer **A** and rationalise its formation.

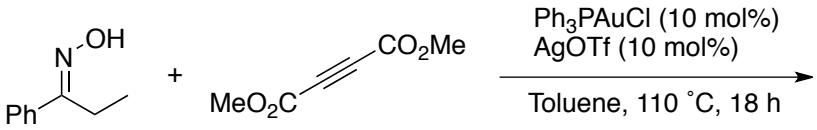


A

Hint: **A** contains 3 Ar-H shifts in the 1HNMR and 3 bromine atoms are incorporated.

Heterocycles, 1990 , vol. 31, # 7 p. 1261 - 1270

Q3. Identify heterocycle **B** and propose a mechanism for its formation.

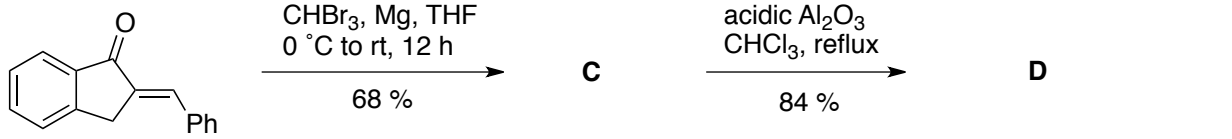


B

IR 3479, 1781, 1459, 1398, 1112, 987
1H NMR 9.63 (br s, 1H), 7.57 (d, J = 7.4 Hz, 2H), 7.44 (t,J=7.4Hz,2H), 7.36 (t,J=7.4Hz,1H), 6.94 (d,J=3.1 Hz, 1H), 3.94 (s, 3H), 3.91 (s, 3H)
HRMS (ESI) m/z [M + Na]+ found 282.0741

Chemical Communications, 2011 , vol. 47, # 6 p. 1857 - 1859

Q4. Propose mechanisms and identify tricyclic structures **C** and **D**.

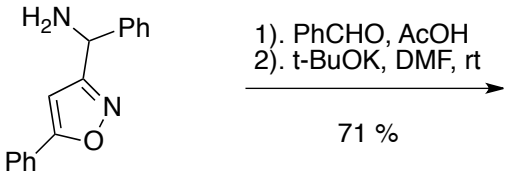


m/z 390 (25%), 392 (50%), 394 (25%)

m/z 310 (50%), 312 (50%)

J. Org. Chem., 2013, 78 (3), pp 910–919

Q5. Identify **E** and propose a mechanism for its formation (hint: **E** contains an imidazole).



E

$C_{23}H_{18}N_2O$
IR 1687
1HNMR 4.58 (2 H, s, CH2), 7.35–7.69 (11 H, m, Ph), 7.89–7.96 (2 H, m, Ph), 8.07–8.09 (2 H, m, Ph) and 10.69 (1 H, br s, NH, exch. with D2O)

Organic and Biomolecular Chemistry, 2011 , vol. 9, # 2 p. 491 - 496