Scalable Total Synthesis of Portimine A and B Reveals the Basis of Their Potent and Selective Anti-cancer Activity


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Hint step 1: Formation of terminal alkene
Step 2: Please, name the reaction, the reagent 1 and show structure of the salen ligand.

Diels-Alder, Rawal’s diene

Hint step 4: E1cb reaction occurs
Step 5: Please, show the mechanism.

Hint step 8: Loss of water
Hint step 9: Formation of reactive organocuprate
Step 11: Who developed this type of catalyst?
Alois Fürstner et al.

Hint step 12: Concomitant silyl deprotection.
Hint step 13: Three heterocycles are formed.
15. L-selectride, THF, –78 °C
16. NaBH₄, MeOH, 0 °C
17. TEMPO, NaOCl, KBr, NaHCO₃, DCM, H₂O, 0 °C
18. Zn, AcOH, H₂O, 70 °C
19. TBSOTf, Et₃N, DCM, reflux
20. DMDO (excess), acetone, DCM, 0 °C
21. Ac₂O (excess), Et₃N, DCM, 35 °C
22. LiOH, THF, H₂O, 0 °C
23. 6, Pd(dpff)Cl₂, Et₃N, n-PrOH, 90 °C
24. DMP, NaHCO₃, DCM, r.t.
25. NH₃, H₂O, MeOH

Step 18: Please, suggest a mechanism.

Hint step 20: Oxidation at 2 positions.

Step 21: Please, show the mechanism.
Which analogous named rearrangement uses 2-alkylpyridine- N-oxides as substrates? Classify the rearrangement.

Boekelheide rearrangement, [3,3]sigmatropic

Hint step 22: Selective mono-deprotection.
Step 5: Please, show the mechanism.

Step 18: Please, suggest a mechanism.
Step 21: Please, show the mechanism.

[3,3]-sigmatropic rearrangement