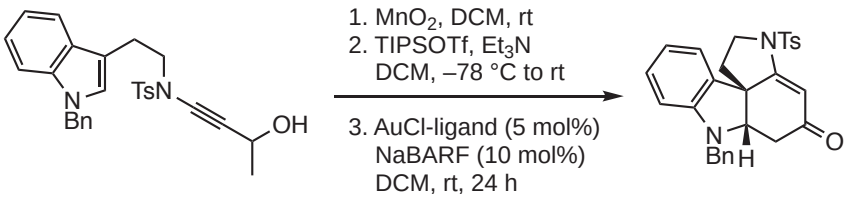

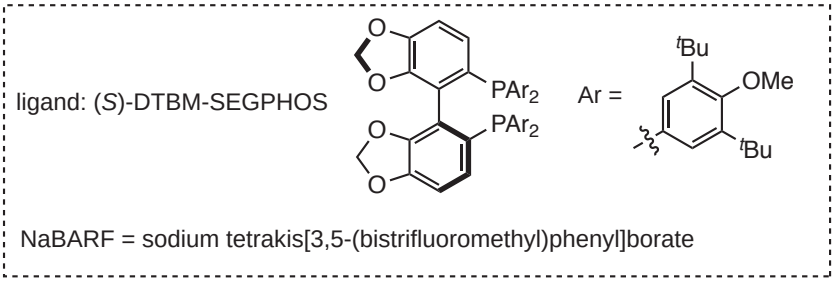

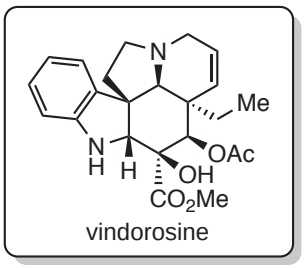

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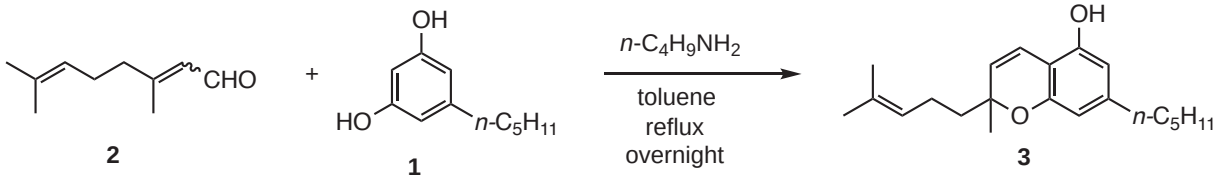
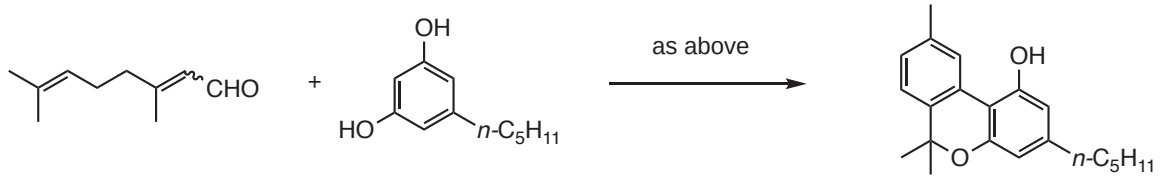
Q: Propose reasonable intermediates and mechanisms of the following transformations.



To a stirred solution of olivetol (**1**, 100 mg, 0.554 mmol) toluene (5mL), citral (**2**, 91 µL, 0.533 mmol) and *n*-butylamine (53 µL, 0,533 mmol) were added. The mixture was refluxed overnight, then cooled to room temperature, in which geranration of **3** was confirmed by TLC analysis. Then, Dowex 50 W X 8 (200 mg) was added, and the solution was stirred for 10 minutes at room temperature then filtered over celite pad in a new round bottomed flask. To the filtered solution, iodine (268 mg, 1.066 mmol) was added. The mixture was refluxed for 3 hours, then quenched by addition of sat. Na_2SO_3 and extraction with EtOAc. After drying (Na_2SO_4) and evaporation, the residue was purified by gravity column chromatography on silica gel with PE-EtOAc 95:5 solution to afford CBN (**4**) as a brown oil (94 mg, 0.305 mmol, 55% yield).



cannabinol (**4**)

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