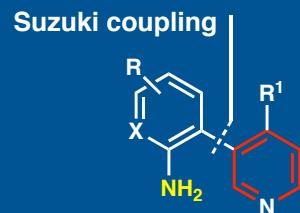


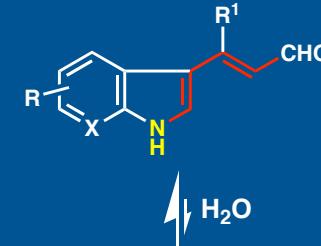
Syntheses of Nitrogen Heterocycles from Pyridines

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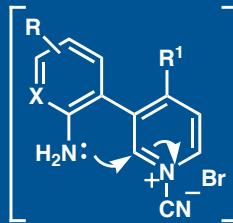
$\xrightarrow{\text{BrCN, EtOH/H}_2\text{O}}$
63–87% yield

substituted indoles with propenal group at C3

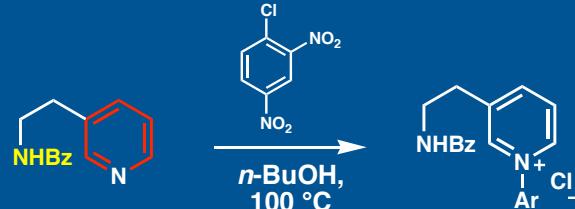
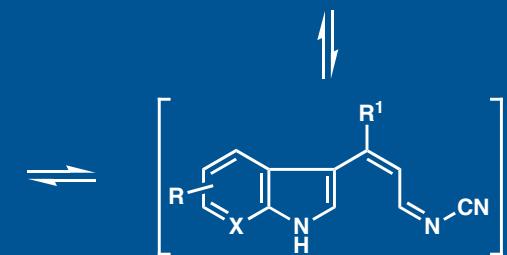
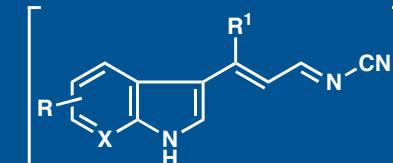


$\xrightleftharpoons{\text{BrCN}}$

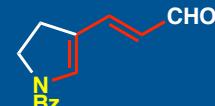
$\boxed{\begin{array}{l} \mathbf{R} = 4\text{-OMe, 5\text{-OMe, 4\text{-CF}_3,} \\ 5\text{-CF}_3, 4\text{-F, 5\text{-Cl, 6\text{-Br}}} \\ \mathbf{R^1} = \text{H, Me} \\ \mathbf{X} = \text{CH, N} \end{array}}$



*6 π retro electrocyclization, or
expulsion of the electron-deficient
cyanamide followed by tautomerization*



$\xrightarrow[\text{then NaOH/H}_2\text{O}]{\text{Me}_2\text{NH (4 equiv.)}, \text{EtOH, } 50^\circ\text{C}}$
57% yield,
2 steps



*dihydropyrrole core
of porothramycins*

