The Total Synthesis of Phalarine via a Stereospecific Pictet–Spengler Reaction:
Transfer of Chirality from L-Tryptophane


Try to come up with a reasonable mechanism for the first three synthetic steps.
Provide a mechanism for transformation 9.

This transformation is mechanistically discussed in the parent publication of this total synthesis: *JACS* 2010, 132, 8506–8512.
Provide a mechanism for transformation 15. (Hint: the original investigations on this type of reaction were done with \( t\)-BuOCl instead of \( \text{SO}_2\text{Cl}_2 \).

Draw "proton-sponge".

The following mechanism was proposed by Gassmann and van Bergen: *JACS* 1974, 96(17), 5508–5512.

![Mechanism Diagram](image)

Proton Sponge

\[ \text{pKa (H}_2\text{O): 12.1} \]
18) \( \text{N}^+\text{Cl}^-, \text{AcOH} \)

19) \( \text{Na(Hg), NaHPO}_4, \text{MeOH} \)


**Mechanism for transformation 13:**