Annulation Reactions Catalyzed by Amberlite-Bound Hexafluorophosphate

\[ \text{NR}_3^+ \text{Cl}^- \xrightarrow{\text{Amberlite } 900 \text{, } 10\% \text{ aq NaPF}_6} \text{NR}_3^+ \text{PF}_6^- \]

**Significance:** Amberlite resin-bound hexafluorophosphate (Amberlite-PF$_6$) was prepared by treatment of Amberlite 900 with aqueous NaPF$_6$ (eq. 1). In the presence of Amberlite-PF$_6$, the annulation of phenylenediamines 1 with aldehydes 2 took place to give the corresponding benzimidazoles 3 (25 examples, 72–96% yield).

**Comment:** The binding of hexafluorophosphate on Amberlite resin was confirmed by IR spectra (557 and 832 cm$^{-1}$), though other characterizations were not given. Phenylenediamines 1 also reacted with $\alpha$-bromoketones 4 in the presence of Amberlite-PF$_6$ to give the corresponding quinoxalines 5 via an aromatization step.