Click Reaction Using Polymer-Supported Cul–Cryptand-22

**Significance:** A polystyrene resin supported Cul–cryptand-22 complex (PS–C22–CuI) was prepared by mixing chloromethylated polystyrene with cryptand-22 in diethyl ether, followed by the complexation with CuI in ethanol (eq. 1). PS–C22–CuI catalyzed the click reaction of azides with terminal alkynes (eq. 2, method A) or the one-pot three-component reaction from alkyl halides, sodium azide, and terminal alkynes (eq. 3, method B) to give the corresponding 1,2,3-triazoles in up to 99% yield.

**Comment:** The PS–C22–CuI complex was characterized by FT-IR, EDX, SEM, XPS, and TG-DTA analysis. In both methods A and B for synthesizing 1-benzyl-4-phenyl-1H-1,2,3-triazole, the catalyst was recovered by filtration and reused three times.

**Selected examples:**
- 99% yield (eq. 2)
- 78% yield (eq. 2)
- 93% yield (eq. 2)
- 86% yield (eq. 2)
- 73% yield (eq. 3, X = Br)
- 95% yield (eq. 3, X = Br)
- 82% yield (eq. 3, X = Cl)

**Equations:**
1. \[
\text{PS} + \text{Ch}_{2}Cl \xrightarrow{\text{Et}_{2}O, \text{r.t.}, 72 \text{ h}} \text{ PS–C22–CuI}
\]
2. \[
R^1-N_3 + \rightleftharpoons R^2 \xrightarrow{\text{H}_2\text{O, r.t., 10 h}} R^1-N=N-N^2
\]
3. \[
R^1-X + \text{NaN}_3 + \rightleftharpoons R^2 \xrightarrow{\text{H}_2\text{O, r.t., 15–21 h}} R^1-N=N-N^2
\]