Cobalt Molybdenum Sulfide-Catalyzed S-Alkylation of Thiols or H₂S with Alcohols

**Significance:** Nanolayered cobalt–molybdenum sulfide (Co–Mo–S) catalyzed the alkylation of thiols with alcohols to give the corresponding thioethers in ≤96% yield (eq. 1). Co–Mo–S also catalyzed the reaction of benzyl alcohols with hydrogen sulfide to give symmetrical thioethers (eq. 2).

**Comment:** The authors previously reported the preparation of Co–Mo–S and its applications in the hydrogenation of nitroarenes and quinolines (ACS Catal. 2017, 7, 2698; ACS Catal. 2018, 8, 4545). In the alkylation of benzenethiol with benzyl alcohol, the catalyst was recovered and reused five times with a gradual loss of its catalytic activity.

**Results:**

**Selected results:**
- R = H, 91% yield
- R = Me, 90% yield
- R = F, 96% yield
- R = Br, 94% yield
- R = CN, 90% yield
- R = Ac, 92% yield
- R = COOMe, 89% yield
- R = Ph, 89% yield
- R = F, 95% yield
- R = Bu, 91% yield
- R = OMe, 84% yield
- R = SMe, 81% yield
- R = CF₃, 51% yield
- R = OCF₃, 80% yield
- R = COOMe, 86% yield

40 examples up to 96% yield

**Results:**
- R = H, 66% yield
- R = Me, 75% yield
- R = OMe, 70% yield
- R = Br, 44% yield
- R = CN, 67% yield
- R = Ac, 70% yield
- R = Ph, 72% yield
- R = COOMe, 82% yield

10 examples up to 75% yield