Category

Metals in Synthesis

Key words

acyl radicals

copper catalysis

C–O bond formation

desymmetrization

1,3-diols

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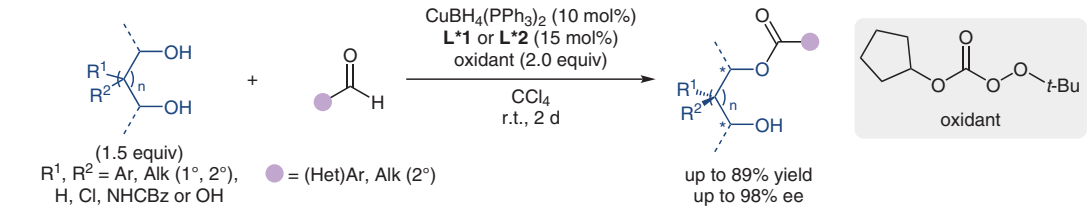
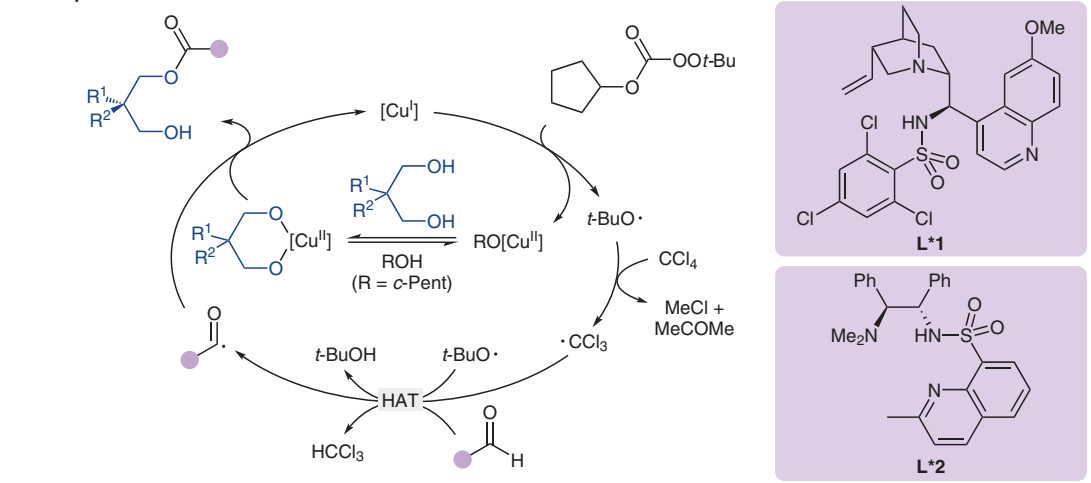
Cu(I)-Catalyzed Chemo- and Enantioselective Desymmetrizing C–O Bond Coupling of Acyl Radicals

J. Am. Chem. Soc. **2023**, *145*, 6535–6545, DOI: 10.1021/jacs.3c00671.

Copper-Catalyzed Desymmetrization of Prochiral and Meso Alcohols with In Situ Generated Acyl Radicals

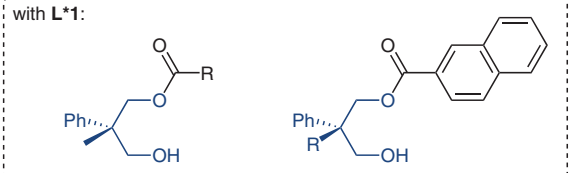


Proposed mechanism:



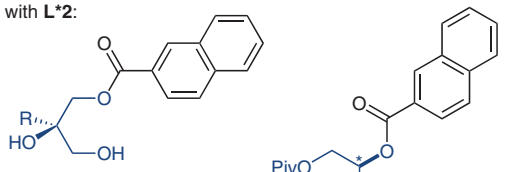
Selected examples:

with **L*1**:



R = Cy:	59% yield, 79% ee	R = Et:	76% yield, 93% ee
R = Ph:	86% yield, 92% ee	R = *i*-Pr:	89% yield, 95% ee
R = PMP:	76% yield, 92% ee	R = Bn:	78% yield, 96% ee
R = 2-furyl:	58% yield, 92% ee	R = CH_2CCH:	61% yield, 93% ee

with **L*2**:



R = H:	71% yield, 95% ee		
R = Me:	77% yield, 96% ee		
R = *i*-Pr:	67% yield, 93% ee		
R = Ph:	68% yield, 97% ee		

74% yield, 85% ee

Significance: Gu, Liu and co-workers report a copper-catalyzed desymmetrization of prochiral and meso alcohols by C–O bond coupling with in situ generated acyl radicals. This protocol is compatible with a broad range of alcohol substrates, such as 2,2-disubstituted 1,3-diols, 2-substituted 1,2,3-triols, 2-substituted serinols, and meso 1,2- and 1,4-diols.

Comment: Mechanistic studies support the shown mechanism in which an acyl radical is formed in situ with the participation of the carbon tetrachloride solvent. This transformation provides a practical method for the preparation of chiral C3 building blocks from readily available alcohols including biomass-derived feedstocks such as glycerol.

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Synfacts 2023, 19(06), 0570 Published online: 11.05.2023
DOI: 10.1055/s-0042-1752533; **Reg-No.:** M07723SF