

# Dinuclear complexes of copper(I) with crown ether-containing N-thiophosphorylated bis-thioureas and 2,2'-bipyridine or 1,10-phenanthroline: Synthesis, characterization, and picrate extraction properties

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## Abstract

Reaction of O,O'-diisopropylthiophosphoric acid isothiocyanate (iPrO)  $2P(S)NCS$  with 1,10-diaza-18-crown-6, 1,7-diaza-18-crown-6, or 1,7-diaza-15-crown-5 leads to the N-thiophosphorylated bis-thioureas N,N'-bis[C(S)NHP(S)(OiPr) $_2$ ]-1,10-diaza-18-crown-6 (H $_2$ LI), N,N'-bis[C(S)NHP(S)(OiPr) $_2$ ]-1,7-diaza-18-crown-6 (H $_2$ LII) and N,N'-bis[C(S)NHP(S)(OiPr) $_2$ ]-1,7-diaza-15-crown-5 (H $_2$ LIII). Reaction of the potassium salts of H $_2$ LI-III with a mixture of CuI and 2,2'-bipyridine (bpy) or 1,10-phenanthroline (phen) in aqueous EtOH/CH $_2$ Cl $_2$  leads to the dinuclear complexes [Cu $_2$ (bpy) $_2$ LI-III] and [Cu $_2$ (phen) $_2$ LI-III]. The structures of these compounds were investigated by  $^1H$ ,  $^{31}P\{^1H\}$  NMR spectroscopy, and elemental analysis. The crystal structures of H $_2$ LI and [Cu $_2$ (phen) $_2$ LI] were determined by single-crystal X-ray diffraction. Extraction capacities of the obtained compounds in comparison to the related compounds 1,10-diaza-18-crown-6, N,N'-bis[C(=CMe $_2$ )CH $_2$ P(O)(OiPr) $_2$ ]-1,10-diaza-18-crown-6, N,N'-bis[C(S)NHP(O)(OiPr) $_2$ ]-1,10-diaza-18-crown-6 towards the picrate salts LiPic, NaPic, KPic, and NH $_4$ Pic were also studied. Copyright © 2010 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

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## Keywords

1-10-Phenanthroline, 2-2'-Bipyridine, Copper, N-Thiophosphoryl bis-thiourea, X-ray diffraction