

Oxygen-rich molybdenum and chromium complexes: Synthesis, structure and catalysis

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A hitherto unknown¹ pentagonal bipyramidal complex, $[\text{MoO}(\text{O}_2)_2(\text{QO})_2]$ (**1**) (QOH = 8-quinolinol) very efficiently (almost quantitative yield and high turnover number) catalyses homogeneous liquid phase oxidation of methyl benzenes, viz., toluene and *o*- and *p*-xylenes to benzoic acid, phthalic acid and *p*-toluic acid respectively, using H_2O_2 and O_2 as oxidants. $[\text{MoO}(\text{O}_2)_2 \cdot 2\text{QOH}]$ (**2**) on attempted crystallization from CH_3CN affords (**1**). Again (**1**) when treated with H_2O_2 affords (**2**) and hence these observations suggest that (**1**) is the catalyst precursor and (**2**) the active species.

$[\text{CrO}_3(\text{OH})]^-$ (**3**) obtained by crystallizing $[\text{CrO}(\text{O}_2)_2(\text{OH})]^-$ from acetonitrile is an astonishingly potential catalyst in selective oxidation of cinnamaldehyde to cinnamic acid with high turnover, but this apart, (**3**) catalytically reduces water present in organic solvent to dihydrogen while oxidising benzaldehyde and cinnamaldehyde to the respective acids. The same catalyst shows catalase type behaviour bringing out dioxygen from hydrogen peroxide.

Reference

1. Bandyopadhyay R, Biswas S, Guha S, Mukherjee A K and Bhattacharyya R 1999 *J. Chem. Soc., Chem. Commun.* 1627