

THE CATALYTIC GAS PHASE OXIDATION OF METHANOL TO FORMALDEHYDE

Tom Waters, Richard A.J. O'Hair, Anthony G. Wedd

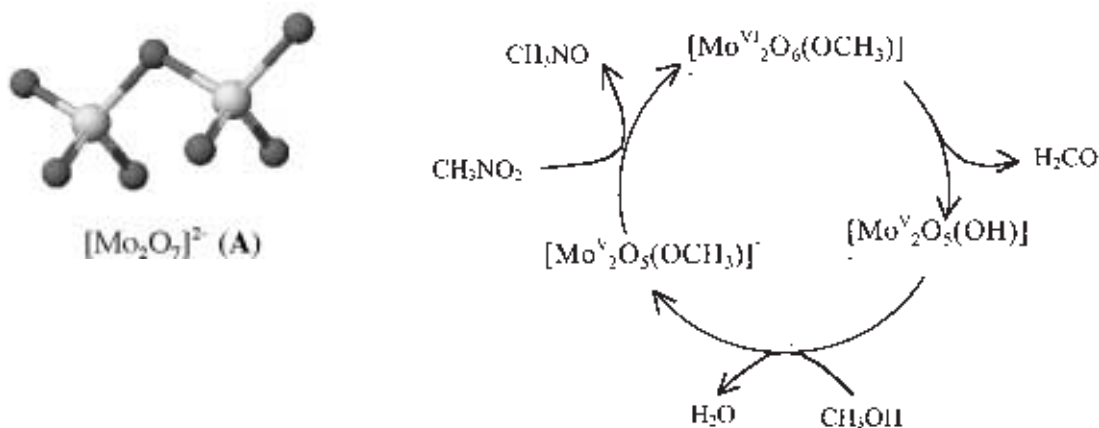
School of Chemistry, The University of Melbourne, Parkville, Victoria, 3052.

ESI allows quaternary ammonium salts of the dimolybdate anion, $[\text{Mo}_2\text{O}_7]^{2-}$ (**A**), to be transferred to the gas phase, yielding the dianion, **A**, and the ion pair, $\{(\text{R}_4\text{N}^+)[\text{Mo}_2\text{O}_7]^{2-}\}$. Each of these can act as precursors of $[\text{Mo}_2\text{O}_6(\text{OCH}_3)]^-$ which catalyses the gas phase oxidation of methanol to formaldehyde¹ :-



Isotopic labelling of neutral reagents and the catalytic centre allows the mechanism of each step in the cycle to be explored in detail. Furthermore, the role of the metal centre can be evaluated through kinetic and mechanistic comparisons of **A** with $[\text{Cr}_2\text{O}_7]^{2-}$ and $[\text{W}_2\text{O}_7]^{2-}$ (related group six analogues).

The present system may clarify the industrial oxidation of methanol to formaldehyde as catalysed by solid state molybdenum(VI) oxide catalysts. A detailed molecular understanding of the mechanisms of this process remains elusive².



¹ Waters, T., O'Hair, R.A.J., Wedd, A.G., Chemm. Commun., 2000, 225-226

² W.E. Farneth, R.H. Staley, A.W. Sleight, J. Am. Chem. Soc., 1986, 108, 2327-2332