

Molybdenum in Catalysis: From Molecular Model Systems to Bio Inspired and Heterogeneous Catalysts

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The global decline of fossil fuels necessitates the development of alternative energies and resource-conserving processes. The conversion of lower alkanes, especially methane.^[1] i.e. is a highly appreciated pathway in terms of availability and sustainability, but novel catalysts need to be created in order to make this conversion applicable. Here, molybdenum based catalysts present themselves as particularly versatile, ranging from enzymatic processes^[2] in nature to heterogeneous catalysts like α -MoO₃, which is a well-established precatalyst for the selective oxidation of alkanes.^[3] However, only little is known about the detailed composition and reaction pathways of the catalytic active species and the investigation of suitable model systems is necessary.

Because of their intrinsic variability and complexity dinuclear molybdenum complexes of the structure Mo₂(OR)₆ present themselves as convenient starting materials.^[4] In our group we recently developed novel approaches to selectively derivatize and oxidize these systems^[5] in order to provide new molecular model systems, which are tested for their catalytic activity, modified and adapted to certain reaction pathways. Applying these tools, we discovered surprising details and insights into the world of molybdenum based catalysis.

Literature:

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