

In situ functional analysis of metal oxides in selective oxidation catalysis

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Selective Oxidation catalysts are complex multi-element multi phase functional solids. In order to better exploit the potential of selective oxidation or to develop new processes the understanding for the need to use such complex catalysts is essential. A number of heuristic principles have been derived to rationalise this problem (“pillars in selective oxidation”)

Modern in situ functional analysis of model and technical oxide systems based upon molybdates are used to illustrate a rational approach towards the determination of the minimum complexity of the catalysts. It is found that a single sub-oxide of molybdenum oxide is the target structure. The structure is, however functional if a specific defective structure of the long range order is present. The preparation and stabilisation of this state of matter requires highly specific treatment conditions and calls for the addition of promoter elements interfering with the generation and stabilisation of the defect structure.