Abstract

Molybdenum oxide based catalysts is prepared by precipitation method. The influence of preparation variables of temperature, acid concentration and molybdenum concentration on the structure of molybdenum oxide is investigated by Powder X-ray Diffraction, Raman Spectroscopy, Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM). The combination of Powder XRD and Raman Spectroscopy was used to identify the phase and the structure of the fresh precipitate. TEM and SEM are applied as a supplement to get a better understanding of the structure and morphology of the molybdenum oxide obtained. The current preparation routine for MoVTeNb Oxides defect introduction is the incorporation with foreign atoms although the high chemical complexity of such systems makes understanding and control of catalyst formation extremely difficult. An alternative way is to reduce the chemical complexity by maintaining the same high structural complexity by preparing Molybdenum Oxide alone. Nanotechnology is a suitable tool for making specific oligo anions by carefully connecting MoO$_6$ octahedra. Four types of cation used were found to be clearly influencing the phase and structure obtained by looking at the size of the series Li$^+$ < Na$^+$ < K$^+$ < NH$_4^+$. Ammonium as counter-ion produced supramolecular Mo$_{36}$O$_{112}^{4-}$ and hexagonal MoO$_3$ while potassium yielded supramolecular Mo$_{36}$O$_{112}^{4-}$, hexagonal MoO$_3$, and additional phase trimolybdate. Both sodium and lithium resulted in hexagonal MoO$_3$ and orthorhombic MoO$_3$ respectively.
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