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XAFS Characterization of Mo/ZSM-5 Catalysts for Methane Conversion to Benzene: Effect of Additives

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ZSM-5 supported Mo catalysts for the dehydroaromatization reaction of methane were characterized by Mo K-edge EXAFS, NH₃-TPD, and XPS techniques. Mo/ZSM-5 catalysts showed the maximum activity for benzene formation at 5 wt% Mo. The activity of the catalysts was related to the particle size of Mo₂C supported on ZSM-5 estimated by Mo K-edge EXAFS. The addition of a second metal did not increase the activity for benzene formation. These results are ascribed to the weakening of the interaction between the acid sites of ZSM-5 and Mo oxide precursors due to competitive consumption of zeolite protons by added metal atoms, resulting in the formation of less dispersed Mo carbide particles and the decreased number of acid sites.

Keywords: [Molybdenum carbide](#), [ZSM-5](#), [Methane aromatization](#), [EXAFS](#)

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