

Study of CO Oxidation Catalysis by LaCoO₃/ZrO₂ at Low Temperature and the Influence of SO₂

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Different processes in industry produce CO containing flue gases. Often, low temperature oxidation of CO to CO₂ is desirable for energy exploitation as well as environmental considerations. The presence of SO₂ increases the difficulty of developing an oxidizing catalyst for temperatures below 250 °C. Known catalysts based on platinum show significant conversion of SO₂ to SO₃ which forms an unwanted liquid film on solid surfaces in contact with the humid gas. This phenomenon will promote limitations for species transport to and from the catalysts active surface. For a better understanding of the ongoing processes, a generally valid model for the capillary condensation of sulfuric acid solutions based on the Kelvin equation is applied. Towards the development of a carbon selective oxidizing catalyst perovskites are seen as promising active phases, whereby LaCoO₃ supported on ZrO₂ is evaluated by performing thermogravimetric analyses with FTIR off gas analysis to study the influence of SO₂ on the activity of the catalyst. It can be demonstrated that for certain conditions the conversion of SO₂ does not take place. However, a deactivation by SO₂ is observed which can be described by a simple acid base model. Based on the gained knowledge, suggestions for future research and development are presented.