

Characterization of ZrO_2 with different phases prepared by precipitation method

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Zirconia (ZrO_2) is widely used in catalysis both as a support and catalyst due to its unique physical and chemical properties. Zirconia exhibits three polymorphic phases: monoclinic, tetragonal, and cubic phases. Although the monoclinic phase is thermodynamically more stable, the tetragonal phase can be stabilized at room temperature under certain conditions. The zirconia was synthesized using the chemical precipitation technique through a reflux method at 100 °C and maintained for 1 - 168 h with vigorous stirring. The white precipitate was dried in an oven at 100 °C for 24 h and calcined at 700 °C for 6 h under flowing air. The crystal phase and surface area of prepared ZrO_2 was dependent on the aging time. The XRD pattern of ZrO_2 indicated that the tetragonal phase increased with increasing aging time. Zirconia which had been aged for 120 and 168 h were purely tetragonal. The increase of the aging time leads to a significant increase in the surface area. The zirconia was also characterized by XRD, N_2 -sorption, SEM, NH_3 -TPD and 2-propanol dehydration reaction.