

Thermal stability of supported-ZnO catalysts for Reverse-Water-Gas-Shift Reaction (RWGSR)

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Reverse-Water-Gas-Shift Reaction (RWGSR) was carried out over the ZnO, Al₂O₃, and ZnO/Al₂O₃ catalysts at the temperature range from 400 to 700°C. The ZnO showed good specific reaction activity but this catalyst was deactivated. All the catalysts except the ZnO/Al₂O₃ catalyst(850°C) showed low stability for the RWGSR and was deactivated at the reaction temperature of 600°C. The ZnO/Al₂O₃ catalyst calcined at 850°C was stable during 210 hrs under the reaction conditions of 600°C and 150,000 GHSV, showing CO selectivity of 100% even at the pressure of 5 atm. The high stability of the ZnO/Al₂O₃ catalyst (850°C) was attributed to the prevention of ZnO reduction by the formation of ZnAl₂O₄ spinel structure. The spinel structure of ZnAl₂O₄ phase in the ZnO/Al₂O₃ catalyst calcined at 850°C was confirmed by XRD and electron diffraction.