

Thermogravimetric Analysis Of The Oxygen Transfer Capacity Of Ilmenite As An Oxygen Carrier In Oxy-Fuel Combustion Systems

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The successful operation of oxy-fuel combustion of coal relies upon the cyclic oxidation and reduction of a metallic oxide oxygen carrier. The metal oxide bed material can be an additional oxygen source which can capture and release oxygen and is able to oxidize volatile gases from solid fuels. In this study, the reactivity of ilmenite in the oxidation reaction with air atmosphere and in the reduction reaction with the reducing gases (CO, H₂, or CH₄) has been determined by thermogravimetric analysis. There is an increase in both the reduction and oxidation extension during the repeated redox cycles. The mass loss is considered to be exclusively due to oxygen transfer and is reached at a value of 2 % after 9 cycles. The reactivity may be improved when ilmenite is calcined and made active. The experimental data shows that ilmenite provides over 5% oxygen transport capacity with successive cycles and the capacity does not decrease further at H₂ atmosphere, whereas ilmenite provides just less than 2% capacity through the successive cycles at CH₄ or CO atmosphere.