

Development of regeneration Mg-based sorbents promoted with Ce, Fe and Ti for SO_x removal

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SO_x can be formed by oxidation of sulfur in fossil fuel and emitted from the industrial processes such as catalyst regeneration unit of RFCC and FCC. In this study, the MgO-based sorbents promoted with Ce, Fe and Ti were tested for the removal of SO_x and their abilities of SO_x absorption as well as regeneration were investigated in a fixed-bed under RFCC and FCC conditions (sulfation of MgO in the presence of SO_x at 700°C, regeneration of MgSO₄ to MgO in the presence of H₂ at 530°C). Ce promoter played an important role in the oxidation of SO₂ into SO₃ which could be easily absorbed to the MgO and Fe promoter improved the regeneration property of the sorbent through a catalytic role in the reaction of metal sulfate to metal oxide. Ti promoter prevented the deactivation of the sorbent during multiple cycles. However, in the case of CeFeMgTi sorbent by simultaneous coprecipitation, the rate of absorption was slower than that of the sorbent without Ti component. To solve this problem, we prepared a new sorbent which was made by mixing a gel solution containing Mg, Fe and Ce and TiO₂ powder prepared by sol-gel method. The sorbent showed the rapid rate, large capacity of absorption and excellent regeneration property.