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Influence of calcined temperature on the surface and catalytic properties of sulfated vanadiatitania catalysts for partial oxidation of methanol

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D imethoxymethane (CH₃OCH₂OCH₃), as an important chemical intermediate, was widely used as diesel additive and building block in organic synthesis. Generally, DMM is produced by the two-stage synthesis. Such a flow chart could lead to a high cost, which inhibits the application of DMM. Compared with the two-step technique, the one-stage technique can synthesize DMM on the bi-founctional (employing redox sites and acidic sites) catalysts (3CH₃OH + 1/2O₂ \rightarrow CH₃OCH₂OCH₃ + 2H₂O). This technique is expected to avoid the drawback of the two-stage production. In this paper, the sulfated VOx-TiO₂ (VT) catalysts were used for the one-step synthesis of DMM. In the present work, the sulfate modified catalysts were synthesized by rapid combustion (RC) method, and the effect of calcined temperature on catalytic structure, acidity and reducibility as well as the catalytic performance in one-step oxidation of methanol to DMM were studied. The results showed that the vanadia and sulfate were highly dispersed as the catalyst calcined at 723 and 773 K, while aggregated at 673 and above 823 K. The highly dispersed vanadia was more active than the aggregated vanadia. And the highest DMM selectivity was obtained on the catalysts calcined at 773 K.

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