

Effect of Superfine Composite Transition Metal Oxide on Thermal Decomposition of Ammonium Perchlorate

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Abstract: The catalytic effects of superfine transition metal oxides Fe_2O_3 , CuO and Co_2O_3 on the thermal decomposition of ammonium perchlorate was studied by differential thermal analysis. Results show that both the single transition metal oxide and the composite ones have catalytic effects on the thermal decomposition of AP ($\text{Co}_2\text{O}_3 > \text{CuO} > \text{Fe}_2\text{O}_3$ and $\text{Fe}_2\text{O}_3/\text{Co}_2\text{O}_3 > \text{CuO}/\text{Co}_2\text{O}_3 > \text{Fe}_2\text{O}_3/\text{CuO}$ in sequence), and the catalytic behavior of the composite transition metal oxides (TMOs) showed three cooperative effects, which depended on the combination and suitable mixing proportion of TMOs. From the curves of the temperature change of the higher exothermic peak of AP decomposition with the content of one of the composite TMOs, the optimum combination ($\text{Fe}_2\text{O}_3 : \text{Co}_2\text{O}_3 = 1 : 3$) can be found.

Key words: analytic chemistry; transition metal oxide (TMO) composite; ammonium perchlorate; catalytic behavior; thermal decomposition; cooperative effect

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