# Catalysts for the low-temperature removal of volatile organic compounds (VOCs)

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**Abstract**

The increasing prevalence of indoor lifestyles has underscored the importance of managing indoor air quality. Volatile organic compounds (VOCs) and carbon monoxide (CO), emitted from various sources, are primary pollutants known for their detrimental health effects. Complete catalytic oxidation of VOCs to CO and HO, and CO to CO, is a viable solution to this issue. Noble metal-supported catalysts (e.g., Pt/TiO) proved to be highly efficient for these reactions at lower temperatures, although their high cost and limited stability pose significant challenges. Researches have been oriented to transition metal oxide-based catalysts as promising alternatives, for their enhanced catalytic performance, cost-effectiveness, and robust resistance to poisoning. Most research groups have focused on the catalytic oxidation of single VOCs, despite the realistic conditions where VOCs are present as mixtures in the indoor air. Addressing this gap, we investigated the catalytic activity of CoFeO, CeO, and a CeO/CoFeO composite for the removal of a three-component mixture of harmful gases: ethanol, acetaldehyde, and CO. The addition of CeO to CoFeO was found to increase the surface area, enhance redox properties, and lower the temperature required for complete mineralization of each gas, whether alone or in a mixture. This study provides valuable insights into the interactive roles between process variables in the low-temperature thermocatalytic oxidation of single and multi-component gaseous VOC systems and highlights the potential for designing cost-effective, high-activity, and selective catalysts.

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