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Determination of Metal Dispersion of Pt/CeO₂ Catalyst by CO-pulse Method

[Shin'ichi Komai](#)¹⁾, [Yoshiteru Yazawa](#)¹⁾, [Atsushi Satsuma](#)¹⁾ and [Tadashi Hattori](#)²⁾

1) Dept. of Applied Chemistry, Graduate School of Engineering, Nagoya University

2) Dept. of Applied Chemistry, School of Engineering, Aichi Institute of Technology

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In order to establish a CO adsorption method for rapid measurement of metal dispersion of catalysts containing CeO₂ that disturbs the measurement due to the adsorption of H₂ or CO, the effect of reduction conditions on CO adsorption over Pt/CeO₂ catalyst was examined on the basis of the standardized manual of CO-pulse method established by the Committee on Reference Catalyst, the Catalysis Society of Japan. Reduction of the catalysts under the standardized condition (673 K, 15 min) showed that Pt catalysts supported on low surface area CeO₂ (12.6 m²·g⁻¹) gave reasonable ratios of adsorbed CO to total Pt. However, the CO/Pt ratio exceeded unity on high surface area CeO₂ support (66.7 m²·g⁻¹), suggesting adsorption of CO on the CeO₂ surface. Reduction of the catalyst under milder conditions at 373 to 573 K for 15 min to 5 h gave constant CO/Pt ratio of 0.40 within a reasonable experimental error. The mean particle diameter estimated from this CO/Pt ratio on the assumption of spherical particles closely agreed with a volume-area mean diameter measured by TEM. It was concluded that the dispersion of Pt supported on CeO₂ can be measured by lowering the reduction temperature to suppress the effect of the CeO₂ support.

Keywords: [Metal dispersion](#), [Platinum catalyst](#), [Ceria support](#), [Carbon monoxide adsorption](#), [Reduction condition](#)



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