Praewpilin Kangvansura 2007: Effects of Preparations: the Pechini, Schiff Base Complex and Coprecipitation, on Structure and Properties of $LaCoO_3$ Perovskite Oxidative Catalyst. Master of Science (Chemistry), Major Field: Chemistry, Department of Chemistry. Thesis Advisor: Associate Professor Attera Worayingyong, Ph.D. 156 pages.

$LaCoO_3$ prepared by a novel Schiff base complex method has a superior property of high adsorbed oxygen to lattice oxygen ratio to the Pechini and coprecipitation methods. The as-prepared gels were characterized by fourier transform infrared spectroscopy (FTIR). The samples prepared by the Pechini and Schiff base complex showed that both lanthanum ion and cobalt ion formed complexes before calcinations. From FTIR and x-ray diffraction (XRD), the formation of $LaCoO_3$ prepared from the sol-gel methods started to form $LaCoO_3$ perovskite phase at low temperature (573 K) with the crystallite sizes of 7 – 9 nm while the higher temperature (823 K) was observed in case of the coprecipitation method. Ratios of adsorbed (α) oxygen to lattice (β) oxygen were quantified using x-ray photoemission spectroscopy (XPS). IR spectroscopy revealed the presents of CO_3^{2-} and NO_3^- on the sample surfaces during heat treatment resulting vacant sites for oxygen to adsorb after formation of gaseous compounds. Diffuse reflectance infrared fourier transform infrared spectroscopy (DRIFTS) study of toluene oxidation on prepared $LaCoO_3$ showed that the small size perovskites without impurity and the high ratio of the adsorbed (α) oxygen to the lattice (β) oxygen performed well. $LaCoO_3$ prepared by the sol-gel method using the Schiff base complex performed higher catalytic activity than that prepared by the Pechini due to the higher ratio of the adsorbed (α) oxygen to the lattice (β) oxygen.

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