

# Cerium (IV) oxide obtaining process by chemical precipitation

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In recent years, several methods to obtain oxides have been widely studied by materials' researchers. These compounds allow changes in their properties based on different applications.<sup>1</sup> The cerium (IV) oxide has several applications such as catalyst and nanofluid.<sup>2,3</sup> Although, process' costs and time must be considered. Chemical precipitation is a simple method and an alternative to minimize the costs of this process.<sup>4</sup> In this work, is presented the methodology to obtain CeO<sub>2</sub> by chemical precipitation.

The precursor of cerium (IV) oxide was 8-hydroxyquinolino of cerium, obtained by chemical precipitation, in triplicate with pH 5 and 9. The characterization of the complexes was performed by infrared spectroscopy (IR), thermogravimetry (TG) and differential thermal analysis (DTA). The oxides were characterized by X-ray diffraction (XRD).

The cerium complex with 8-hydroxyquinoline has different colors, depending on the metal oxidation number. In the trivalent state, the complex is yellow and in the tetravalent, it has a purple color.<sup>5</sup> Based on this study, it was observed that the synthesized complex showed differences in their colorations. The samples synthesized at pH 5 showed a reddish brown color and the synthesized at pH 9, a purple color. The compounds' infrared spectra at different pHs were very similar to each other, showing characteristic 8-hydroxyquinolino bands. The thermal decomposition study indicated a complex obtained with possible coprecipitation of the 8-hydroxyquinoline binder. Was noted, that the final thermal decomposition of the complex obtained at pH 5, occurs at slightly lower temperature than the complex obtained at pH 9. In both cases, the final temperature to obtain the oxide is less than 400 °C, demonstrating that the method is promising, since the oxide is obtained by simple thermal decomposition of the complex and does not require any other thermal processing, minimizing time and obtaining costs.

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