Preparation of high purity cerium precursors for use in automotive catalysts

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Starting with a fraction of mixed rare earths chloride with 47% in CeO_2, high pure cerium oxide and acetate was prepared. The mixed rare earths chloride solution was treated by fractionated precipitation technique. Cerium (III) was oxidized to cerium (IV) by addition of hydrogen peroxide. The acidity liberated in the hydrolytic process was neutralizes with NH_3 stream generated by compressed air injected into the 1M NH_4OH solution and bubbled into the rare chlorides solution. The temperature was maintained at 60ºC. After the complete cerium hydroxide precipitation, it was separated by filtration. This hydroxide precipitate enriched in cerium (90% in CeO_2) was dissolved in hydrochloric acid and the cerium chloride solution was used as the feeling solution to a strong cationic ion exchanger resin system. After loading the resin with de cerium, it was rinsed with water and eluted the ions by complexation with ammonium salt of EDTA adjusted to pH 4,0. Free EDTA acid was precipitated by addition of chloride acid to the cerium complex eluted and it was separated by filtration. The ultimate cerium chloride solution was treated with oxalic acid and the cerium oxalate separated, dried and fired to cerium oxide. The highly pure cerium oxide prepared (99.9%) was directly dissolved with hot concentrated acetic acid.The typical cerium acetate obtained contain the followings contaminants in micrograms per gram: Y(4.1), Sc (15.4), La (32.4), Pr (14.6), Nd (6.5), Sm (9.7), Eu (5.3), Gd (9.2), Tb (6.2), Dy (5.4), Ho (0.08) Er(0.9), Tm (0.2),Yb (20.5), Lu (2.3).

References

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