**Electrosurface properties and stability of cerium dioxide suspensions**

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Cerium dioxide nanoparticles (nanoceria) exhibit high catalytic activity due to the presence of surface defects (primarily oxygen vacancies) and the ability of cerium to exist in two oxidation states Ce3+ and Ce4+ . CeO2 nanoparticles are used as oxidation catalyst, low–temperature gas shift catalyst, as catalyst for photo-catalytic oxidation of organic pollutants in water, for selective hydrogenation catalysis of unsaturated compounds, etc. Besides, nanoceria has been reported to exhibit superoxide oxidase–like and catalase–like activity under different conditions. Nanoceria possess oxidation– reduction properties that make them suitable to play the role of free radical acceptors in living organisms and to inactivate active forms of oxygen. The said properties and applications are to large extent determined by the porous structure, surface and electrosurface characteristics of CeO2 and, in a number of cases, the aggregation stability of their suspensions.

Porous structure of dispersed ceria particles synthesized by destruction (heating) of double salt of cerium and ammonium nitrate has been determined. The surface charge density and electrokinetic potential of particles have been measured by potentiometric titration and microelectrophoresis. The point of zero charge (pzc) was found to correspond to pH 5.6 in water and pH 5.2 in 0.001 M KCl solution, whereas the isoelectric point remains around pH 5.8 for both solutions. Constant (negative) values of ζ-potential in 0.0001-0.01 M KCl solutions have been measured, however at higher salt concentrations, gradual decrease of the ceria electrokinetic potential has been observed. Addition of CaCl2 and AlCl3 or LaCl3 gives a considerable decrease in the ζ-potential of particles and change of its sign correspondingly. After ultrasonic treatment of the suspension monomodal particles size distribution with average particles size of 0.6 µm has been measured. Also the laws of aggregation of CeO2 particles as a function of aging, pH, shear conditions and the concentration of added KCl and CaCl2 solutions have been studied. Obtained results are explained from the viewpoint that micron size strongly hydrated CeO2 particles have a tendency to aggregate in time, under applying shear or in the presence of electrolytes in a secondary minimum with formation of loose, easily destroyable and renewable aggregates.

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