

Environmental benefits of Cerium (IV) Oxide used as a catalyst

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Nanotechnology is a relatively new scientific area that deals with matter at dimensions of a nanometer, from 0.1 to 100 nm. It provides smaller, cheaper and faster devices and permits the reduction in raw materials and energy consumption. Nanotechnology is nowadays fully used in all sorts of different products, ranging from cosmetics to electronics and is said to be offering solutions to many medical, social and environmental problems. However, being a new area new concerns have been raised related to health, environment and safety, especially since materials have different properties at a nanoscale. Therefore it is important to identify all the impacts the use of this technology might have.

This project aims to identifying the advantages and disadvantages of the nano Cerium (IV) Oxide use, focusing mainly on the utilization as a catalyst reducing both fuel consumption and exhaust gas emissions. Cerium oxide serves as an oxygen buffer oxidizing hydrocarbons and reducing nitrogen oxides, which results in reduced emissions of soot, NO_x and CO₂. A reduction in fuel consumption is gained since Cerium Oxide increases the effectiveness of the fuel burn plus it cleans the engine. In the form of a nano particle the efficiency is improved through the increased surface-to-volume ratio. In order to evaluate the risk and benefits of CeO₂ usage the advantages and drawbacks were identified and the Swiss Precautionary Matrix used for completing a preliminary risk assessment.