

**PREPARATION AND CHARACTERIZATION OF CERIUM OXIDE**

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## ABSTRACT

### PREPARATION AND CHARACTERIZATION OF CERIUM OXIDE

Cerium oxide ( $\text{CeO}_2$ ) is a rare earth metal oxide that has many applications to the field of material science including reducing the overpotential in electrical appliances due to its exceptional conducting properties. The purpose of this research is to synthesize  $\text{CeO}_2$  using hydroxide mediated method and to study its crystallinity and morphology using XRD and SEM-EDX. The nanoparticles were prepared using cerium (IV) sulfate,  $\text{Ce}(\text{SO}_4)_2$  and sodium hydroxide,  $\text{NaOH}$  as its precursor. The results for crystallinity study by XRD shows that the sample is crystal with the presence of five intensity peaks, and the highest intensity peak appears at angle  $45.0^\circ$ . The XRD results however do not represent  $\text{CeO}_2$  since the intensity peaks of the sample product is not similar to the intensity peaks of  $\text{CeO}_2$  prepared by literature. As for the morphology study results by SEM-EDX, the sample shows slight agglomeration and exhibits a flake-like morphology. The size of the individual grain is observed to be in the range of 6.75 to 13.5  $\mu\text{m}$ . Intergranular fracture were also detected on the surface sample. The fracture is caused by the inclusion of impurities. Mapping study by EDX also shows that the sample is rich in cerium element with 80.81% of presence on the sample. In conclusion, the final product of this research was indeed not  $\text{CeO}_2$ , but Cerium Palladium Rhodium,  $\text{Ce}_5\text{Pd}_6\text{Rh}_9$ . Conversely, by modifying the method and substituting the chemicals used,  $\text{CeO}_2$  are expected to form through the most economical and practical method.