ABSTRAK

SINTESIS DAN KARAKTERISASI NANOALUMINA BERBASIS ALUMINIUM NITRAT $Al(NO_3)_3.9H_2O$ DENGAN METODE PRESIPITASI

Oleh

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Telah berhasil dilakukan sintesis dan karakterisasi nanoalumina berbasis aluminium nitrat ($Al(NO_3)_3 \cdot 9H_2O$) menggunakan metode presipitasi, dengan fokus pengaruh suhu kalsinasi terhadap struktur kristal, morfologi, dan ukuran partikel. Proses sintesis dilakukan dengan mencampurkan larutan aluminium nitrat dan natrium karbonat, diikuti dengan tahap pengendapan, pencucian, pengeringan, penggerusan, dan kalsinasi pada suhu 700°C, 800°C, 900°C, dan 1000°C selama 7 jam. Hasil karakterisasi XRF menunjukkan bahwa senyawa Al_2O_3 merupakan komponen dominan sebesar 76,16%. Analisis XRD menunjukkan bahwa fase kristal yang terbentuk pada suhu 700–900°C didominasi oleh γ-Al_2O_3, sedangkan pada suhu 1000°C terjadi transisi menuju fase θ-Al_2O_3. Karakterisasi SEM menunjukkan morfologi partikel yang mengalami aglomerasi padat seiring peningkatan suhu. Ukuran partikel dihitung menggunakan persamaan Scherrer, dengan hasil berada dalam rentang 40,9-61,3 nm. Penelitian ini menunjukkan bahwa suhu kalsinasi berpengaruh signifikan terhadap struktur, morfologi, dan dimensi nanoalumina yang dihasilkan.

Kata kunci: nanoalumina, presipitasi, aluminium nitrat, XRD, SEM, ukuran partikel.

ABSTRACT

SYNTHESIS AND CHARACTERIZATION OF NANOALUMINA BASED ON ALUMINUM NITRATE $Al(NO_3)_3 \cdot 9H_2O$ USING THE PRECIPITATION METHOD

By

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The synthesis and characterization of aluminum nitrate ($Al(NO_3)_3 \cdot 9H_2O$)-based nanoalumina using the precipitation method has been successfully carried out, with a focus on the effect of calcination temperature on crystal structure, morphology, and particle size. The synthesis process was carried out by mixing aluminum nitrate and sodium carbonate solutions, followed by precipitation, washing, drying, grinding, and calcination at temperatures of 700°C, 800°C, 900°C, and 1000°C for 7 hours. The XRF characterization results showed that the Al_2O_3 compound was the dominant component at 76.16%. XRD analysis showed that the crystal phase formed at temperatures of 700–900°C was dominated by γ-Al_2O_3, while at 1000°C there was a transition to the θ-Al_2O_3 phase. SEM characterization showed that the particle morphology underwent solid agglomeration as the temperature increased. Particle size was calculated using the Scherrer equation, with results ranging from 40.9 to 61.3 nm. This study shows that calcination temperature has a significant effect on the structure, morphology, and dimensions of the resulting nanoalumina.

Keywords: nanoalumina, precipitation, aluminum nitrate, XRD, SEM, particle size.