

**PENGARUH KONSENTRASI $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ DAN SUHU KALSINASI PADA SINTESIS
Fe-DOPED ZrO_2 SEBAGAI MODEL FOTOKATALIS
RESPONSIF SINAR TAMPAK**

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INTISARI

Sintesis dan karakterisasi Fe-doped ZrO_2 sebagai model fotokatalis responsif sinar tampak telah berhasil dilakukan. Tujuan dari penelitian ini adalah mempelajari pengaruh variasi konsentrasi Fe sebagai dopan dan pengaruh variasi suhu kalsinasi untuk menghasilkan material Fe-doped ZrO_2 yang responsif terhadap sinar tampak. Penelitian ini diawali dengan mereaksikan ZrO_2 dan garam $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ dengan variasi konsentrasi 1, 3, 5, 7 dan 9% (b/v) menggunakan metode refluks lalu dikalsinasi pada variasi suhu 700, 800 dan 900 °C. Sampel kemudian dikarakterisasi menggunakan difraktometer sinar-X (XRD), spektrofotometer *Fourier Transform Infra Red* (FT-IR), spektrofotometer fluoresensi sinar-X (XRF) dan spektrofotometer *Diffuse Reflectance UV-Visible* (DR-UV).

Hasil karakterisasi menunjukkan bahwa material Fe-doped ZrO_2 didominasi oleh fase kristal monoklinik dengan ukuran kristal rata-rata 24,21 nm. Sampel hasil sintesis memiliki nilai energi celah pita (E_g) dengan rentang nilai sebesar 2,88-3,26 eV. Penurunan nilai E_g diketahui mencapai kondisi optimum pada penambahan Fe sebanyak 3% (b/v) untuk setiap variasi suhu kalsinasi. Sampel Fe-doped ZrO_2 3% (b/v) yang dikalsinasi pada suhu 900 °C memiliki E_g terendah sebesar 2,88 eV dengan panjang gelombang serapan 431 nm.

Kata kunci : Besi sulfat heptahidrat, Fotokatalis, Kalsinasi, Zirkonia

THE EFFECT OF $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ CONCENTRATION AND CALCINATION TEMPERATURE IN THE SYNTHESIS OF Fe-DOPED ZrO_2 AS A MODEL OF VISIBLE LIGHT RESPONSIVE PHOTOCATALYST

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ABSTRACT

Synthesis and characterization of Fe-doped ZrO_2 as a model of visible light responsive photocatalyst have been conducted. The purpose of this research were synthesizing the Fe-doped ZrO_2 as a model of visible light responsive photocatalyst material, studying the effect of various concentrations on the addition of Fe as a dopant and studying the effect of various temperature used in calcination process. This research was initiated by the reaction of ZrO_2 with $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ in various concentrations 1, 3, 5, 7 and 9% (w/v) using reflux method. Then the product calcinated in various calcination temperature 700, 800 and 900 °C. All samples were characterized with X-ray Diffractometer (XRD), Fourier Transform Infrared Spectrophotometer (FT-IR), X-ray Fluorescence Spectrophotometer (XRF) and Diffuse Reflectance UV-Visible Spectrophotometer (DR-UV).

The results showed that the Fe-doped ZrO_2 material was dominated by monoclinic crystalline phase with average crystal size of 24.21 nm. Synthesized samples have a band gap energy (E_g) in the range of 2.88-3.26 eV. It has been known that E_g impairment will achieve the optimum conditions on the addition of Fe 3% (w/v) for every variation of calcination temperature. Fe-doped ZrO_2 3% (w/v) sample calcined at 900 °C was known to have the lowest E_g 2.88 eV with a wavelength absorption at 431 nm.

Key words: Ferrous sulfate heptahydrate, Photocatalyst, Calcination, Zirconia