

**PENGARUH AGEN PENSTABIL NATRIUM SITRAT DAN
POLIETILEN GLIKOL PADA UKURAN NANOPARTIKEL Fe₃O₄**

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INTISARI

Nanomaterial magnetik banyak diteliti karena kemungkinan aplikasi yang luas. Sintesis Fe₃O₄ dengan agen penstabil ion sitrat dan polietilen glikol (PEG) telah dilakukan. Penelitian ini bertujuan untuk mempelajari pengaruh agen penstabil natrium sitrat dan polietilen glikol terhadap bentuk dan ukuran nanopartikel magnetit, Fe₃O₄.

Sintesis Fe₃O₄, Fe₃O₄/sitrat dan Fe₃O₄/PEG dilakukan dengan metode kopresipitasi pada pH terkontrol. Magnetit hasil sintesis dikarakterisasi dengan spektrofotometri infra merah, *X-Ray Diffraction (XRD)*, *Transmission Electron Microscopy (TEM)* dan *Scanning Electron Microscopy-Energy Dispersive X-Ray (SEM-EDX)*. Uji kualitatif kemagnetan juga dilakukan kepada ketiga material tersebut.

Hasil penelitian menunjukkan bahwa agen penstabil dapat mempengaruhi proses nukleasi dan pertumbuhan kristal sehingga diperoleh partikel yang lebih bersifat monodispersi. Nanopartikel Fe₃O₄ yang disintesis dengan penstabil natrium sitrat memiliki diameter sekitar 12 nm dan penstabil PEG memiliki diameter sekitar 10 nm. Natrium sitrat membentuk koloid nanopartikel magnetit dengan mode stabilisasi elektrostatik sementara PEG dengan mode stabilisasi sterik.

Kata kunci : agen penstabil, Fe₃O₄, sitrat, polietilen glikol.

EFFECT OF SODIUM CITRATE AND POLYETHYLENE GLYCOL AS STABILIZING AGENT ON THE SIZE OF Fe₃O₄ NANOPARTICLES

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ABSTRACT

Magnetic nanomaterials are intensively studied because of the possibility of various application. Synthesis of Fe₃O₄ with citrate ion and polyethylene glycol (PEG) as stabilizing agents was carried out. This study aims to study the effect of sodium citrate and polyethylene glycol as stabilizing agents on the shape and size of Fe₃O₄ magnetite nanoparticles.

Synthesis of Fe₃O₄, Fe₃O₄/citrate, and Fe₃O₄/PEG was carried out by coprecipitation method at controlled pH. The products were characterized by infrared spectrophotometry, X-Ray Diffraction (XRD), Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy-Energy Dispersive X-Ray (SEM-EDX). Qualitative tests of magnetism were also carried out on the three materials.

The results showed that the stabilizing agent could influence the nucleation and crystal growth processes for obtaining more monodispersed particles. Fe₃O₄ nanoparticles prepared with sodium citrate and PEG have a diameter of 12 and 10 nm, respectively. Sodium citrate leads to Fe₃O₄ colloidal nanoparticle with electrostatic stabilization mode, whereas PEG leads to Fe₃O₄ colloidal nanoparticle with steric stabilization mode.

Key words: stabilizer agent, Fe₃O₄, citrate, polyethylen glycol.