

## ABSTRAK

### **Teguh Hidayat Panjaitan, NIM 4191210002 (2019). Sintesis dan Studi Kinetika Lepas lambat Komposit Karbon Aktif/Alginat-Fe**

Penelitian kinetika lepas lambat ion Fe(III) dari komposit Karbon Aktif/Alginat-Fe(III) atau disingkat K/A-Fe(III) telah dilakukan. Tujuan penelitian ini adalah untuk mensintesis komposit K/A-Fe(III) sebagai material yang berpotensi menjadi pupuk lepas lambat mikronutrisi dan mempelajari kinetika lepas lambat ion Fe(III) dari komposit. Komposit K/A-Fe(III) disintesis dengan mencampurkan suspensi alginat dan Karbon Aktif (rasio berat alginat : karbon aktif = 1:3 dan 3:1) hingga homogen. Butiran komposit dikarakterisasi menggunakan spektroskopi Fourier Transformed Infrared (FTIR), Scanning Electron Microscopy (SEM) dan X-ray Diffraction (XRD). Hasil spectra inframerah menunjukkan adanya gugus -OH pada alginat dan karbon aktif, serta menunjukkan daerah khas sidik jari guluronat dan mannuronat milik alginat. Hasil XRD menunjukkan pengaruh adanya keasaman Fe(III) dapat menurunkan kristalinitas komposit. Kinetika pelepasan Fe(III) dari ketiga variasi komposit didapatkan bahwa KAlg13 menggunakan orde nol, dan KAlg31 kosmeyer-peppas, dan memiliki konstanta laju pelepasan secara berturut 0,00004 jam<sup>-1</sup> dan 1,681 jam<sup>-1</sup>.

**Kata Kunci:** Komposit, Karbon Aktif/Alginat-Fe(III), Lepas Lambat, Kinetika

## ABSTRACT

### **Teguh Hidayat Panjaitan, NIM 4191210002 (2019). Synthesis and Study of Slow Release Kinetics of Activated Carbon/Alginate-Fe Composites**

Research on the slow release kinetics of Fe(III) ions from Activated Carbon/Alginate-Fe(III) composites or abbreviated as K/A-Fe(III) has been carried out. The aim of this research was to synthesize K/A-Fe(III) composite as a material that has the potential to become a slow release micronutrient fertilizer and to study the kinetics of slow release of Fe(III) ions from the composite. The K/A-Fe(III) composite was synthesized by mixing alginate suspension and activated carbon (alginate: activated carbon weight ratio = 1:3 and 3:1) until homogeneous. Composite grains were characterized using Fourier Transformed Infrared (FTIR) spectroscopy, Scanning Electron Microscopy (SEM) and X-ray Diffraction (XRD). The results of the infrared spectra showed the presence of -OH groups in alginate and activated carbon, and showed the typical guluronate and mannuronic fingerprint areas belonging to alginate. The XRD results show that the presence of Fe(III) acidity can reduce the crystallinity of the composite. The kinetics of Fe(III) release from the three composite variations found that KAlg13 used a zero order approach, and KAlg31 kosmeyer-peppas, and had a release rate constant respectively of  $0,00004 \text{ hours}^{-1}$  dan  $1,681 \text{ hours}^{-1}$ .

**Keywords:** Composites, Activated Carbon/Alginate-Fe(III), Slow Release, Kinetics