

PENURUNAN KADAR LOGAM Cu (II) DALAM AIR MENGGUNAKAN ZEOLIT ZSM-5 TERIMPREGNASI TiO₂DENGAN VARIASI KONSENTRASI

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ABSTRAK

Ion logam Cu (II) merupakan logam berat esensial, artinya meskipun Cu (II) logam berat yang beracun, unsur ini sangat diperlukan oleh tubuh meski dalam jumlah yang sedikit. Menurut Departemen Kesehatan yang tertuang dalam Kep.Menkes RI Nomor 492/MENKES/Per/IV/2010 mengatakan bahwa air yang dikonsumsi setiap hari harus memenuhi kualitas air minum yaitu mengandung ion Cu (II) maksimal 2,0 mg/L. Kadar Cu (II) yang melebihi ambang batas dapat menyebabkan kerusakan otak dan fungsi ginjal. Telah dilakukan penelitian penurunan kadar Cu (II) dalam air dengan menggunakan zeolit ZSM-5 terimpregnasi TiO₂ berdasarkan variasi konsentrasi larutan (0,25% b/v; 0,50% b/v; 0,75% b/v; 1,00% b/v; dan 1,25% b/v) selama penyinaran 75 menit. Objek penelitian berupa larutan Cu (II) dengan konsentrasi 50 mg/L. Pengujian dilakukan pula pada kontrol sampel Cu (II) dengan penambahan zeolit ZSM-5 atau TiO₂. Hasil penelitian diperoleh kadar Cu (II) awal sebesar 47,13 mg/L dan persentase penurunan kadar ion Cu (II) variasi konsentrasi 0,25% b/v; 0,50% b/v; 0,75% b/v; 1,00% b/v; dan 1,25% b/v berturut-turut 75,68; 78,38; 79,56; 82,71; 86,94%. Persentase penurunan kadar ion Cu (II) tertinggi pada konsentrasi 1,25% yaitu 86,94%. Berdasarkan hasil statistik p value 0,000 menunjukkan terdapat pengaruh penambahan serbuk TiO₂-ZSM-5 konsentrasi terhadap persentase penurunan kadar Cu (II) dalam air. Kontribusi penelitian adalah penurunan kadar Cu (II) dapat dilakukan penambahan TiO₂-ZSM-5 pada konsentrasi 1,25% b/v selama penyinaran 75 menit. Semakin besar konsentrasi TiO₂-ZSM-5, semakin banyak logam Cu (II) yang terserap sehingga kadar Cu (II) semakin turun dan persentase penurunannya semakin besar.

Kata kunci : Ion Cu(II), Impregnasi, TiO₂-ZSM-5, Variasi Konsentrasi.

DECREASING OF WATER Cu (II) METAL LEVELS USING TiO₂ ZREADGED ZSM-5 ZEOLITES WITH CONCENTRATION VARIATIONS

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ABSTRACT

Cu (II) metal ions are essential heavy metals, meaning that even though heavy metal Cu (II) is toxic, this element is needed by the body even in small amounts. According to the Ministry of Health stated in the Decree of the Minister of Health of the Republic of Indonesia Number 492 / MENKES / Per / IV / 2010 said that water consumed every day must meet the quality of drinking water which contains a maximum of 2.0 mg / L Cu (II) ions. Cu (II) levels that exceed the threshold can cause brain damage and kidney function. Research on the reduction of Cu (II) levels in water using TiO₂ impregnated ZSM-5 zeolite was based on variations in solution concentration (0.25% b/v; 0.50% b/v; 0.75% b/v; 1, 00% b/v; and 1.25% b/v) during 75 minutes irradiation. The object of research was in the form of Cu (II) solution with a concentration of 50 mg/L. Tests were also carried out on Cu (II) sample control with the addition of ZSM-5 or TiO₂ zeolite. The results of the study showed that the initial Cu (II) levels were 47.13 mg/L and the percentage reduction in Cu (II) ion levels varied in concentration of 0.25% b/v; 0.50% b/v; 0.75% b/v; 1.00% b/v; and 1.25% b/v, respectively 75.68; 78.38; 79,56; 82.71; 86.94%. The highest percentage of Cu (II) ion reduction at a concentration of 1.25% is 86.94%. Based on statistical results, p value 0,000 shows the effect of adding TiO₂-ZSM-5 powder to the percentage of Cu (II) in water. The contribution of the research was the reduction in Cu (II) levels which could be added TiO₂-ZSM-5 at a concentration of 1.25% b/v during 75 minutes irradiation. The greater the concentration of TiO₂-ZSM-5, the more Cu (II) metal is absorbed so that the Cu (II) level decreases and the percentage of decrease is greater.

Keywords: Ion Cu (II), Impregnation, TiO₂-ZSM-5, Concentration Variations.