SINTESIS KOMPOSIT MATERIAL MAGNETIK/KITOSAN TERIMPREGNASI NANOPARTIKEL TEMBAGA SEBAGAI ANTIBAKTERI *Escherichia coli* DAN *Staphylococcus aureus*

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INTISARI

Komposit material magnetik/kitosan yang terimpregnasi nanopartikel tembaga (MM/kit/CuNP) telah berhasil disintesis. Nanopartikel tembaga (CuNP) disiapkan menggunakan larutan Cu(II) dengan konsentrasi bervariasi (5, 10, 15, 20, dan 25 mM). Komposit hasil sintesis dikarakterisasi dengan FTIR, XRD, TEM, dan SEM-EDX. Hasil sintesis komposit MM/kit/CuNP diaplikasikan sebagai agen antibakteri terhadap bakteri *Escherichia coli* dan *Staphylococcus aureus*. Aktivitas antibakteri diuji pada sampel dengan metode difusi sumuran yaitu mengukur diameter zona hambat (bening) yang terbentuk.

Hasil penelitian menunjukkan bahwa larutan Cu(II) konsentrasi 20 mM menghasilkan suspensi CuNP dengan absorbansi tertinggi dan ukuran partikel 23,68 nm. Komposit MM/kit yang diimpregnasi dengan CuNP(20) (MM/kit/CuNP(20)) memiliki ukuran 32,95 nm dan menunjukkan aktivitas antibakteri terhadap *Escherichia coli* dan *Staphylococcus aureus* dengan diameter rerata zona hambat masing-masing sebesar 11,7 dan 9,32 mm, lebih tinggi dari komposit MM/kit tanpa impregnasi CuNP (diameter rerata zona hambat 6,3 mm). Hasil ini menunjukkan bahwa komposit MM/kit/CuNP(20) memiliki potensi untuk diaplikasikan pada penghilangan bakteri dari air.

Kata kunci: CuNP, komposit, magnetik, kitosan, antibakteri

SYNTHESIS OF COPPER NANOPARTICLES IMPREGNATED ON MAGNETIC MATERIAL/CHITOSAN COMPOSITE AS ANTIBACTERIAL OF *Escherichia coli* AND *Staphylococcus aureus*

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ABSTRACT

A magnetic material/chitosan composite impregnated with copper nanoparticles (MM/chi/CuNP) has been successfully synthesized. Copper nanoparticles (CuNP) were prepared using Cu(II) solutions with varying concentrations (5, 10, 15, 20, and 25 mM). The synthesized composites were characterized with FTIR, XRD, TEM, and SEM-EDX. The MM/chi/CuNP composite synthesized was applied as an antibacterial agent against *Escherichia coli* and *Staphylococcus aureus* bacteria. Antibacterial activity was tested on samples by well diffusion method, namely measuring the diameter of the inhibition zone formed.

The results showed that the Cu(II) solution with a concentration of 20 mM produced a CuNP suspension with the highest absorbance and a particle size of 23.68 nm. The MM/chi composite impregnated with CuNP(20) (MM/chi/CuNP(20)) gave 32.95 nm in size and showed antibacterial activity against *Escherichia coli* and *Staphylococcus aureus* with an average diameter of inhibition zone of 11.7 and 9.32 mm, respectively which are higher than the MM/kit composite without CuNP impregnation (mean diameter of inhibition zone of 6.3 mm). This result indicates that the MM/chi/CuNP(20) composite has a potential to be applied for bacterial removal from water.

Keywords: CuNP, composite, magnetic, chitosan, antibacterial