

**BIOSINTESIS DAN KARAKTERISASI NANOPARTIKEL PERAK DARI  
ISOLAT BROMELAIN BUAH NANAS (*Ananas comosus* L. Merr)  
SEBAGAI ANTIBAKTERI**

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**INTISARI**

**Latar belakang:** Pemanfaatan buah nanas (*Ananas comosus* L. Merr) telah dilakukan sebagai antioksidan, antiinflamasi, dan antibakteri. Telah banyak riset terkait uji antibakterinya oleh senyawa aktif enzim bromelain. Didukung teknologi nanopartikel perak dengan aktivitas bakterisidal yang tinggi karena ion perak dapat memicu kematian sel bakteri, serta ukuran nanopartikel yang mampu meningkatkan bioavailabilitas obat.

**Tujuan:** Dapat mensintesis dan mengkarakterisasi nanopartikel perak dari isolat bromelain buah nanas serta menguji aktivitas antibakteri nanopartikel perak.

**Metode:** Isolasi untuk mendapatkan isolat enzim bromelain, isolat dilakukan uji perhitungan kadar bromelain secara spektrofotometri. Biosintesis nanopartikel perak dibuat dengan variasi jumlah isolat, larutan perak nitrat, dan PVA dengan metode ultrasonikasi. Selanjutnya, dilakukan karakterisasi dengan observasi visual, observasi panjang gelombang, penentuan ukuran partikel, indeks polidispersitas, zeta potensial, penentuan gugus fungsi dengan FTIR, dan evaluasi morfologi dengan SEM. Kemudian, dilakukan pengujian aktivitas antibakteri metode difusi terhadap bakteri *Staphylococcus aureus*.

**Hasil:** Didapatkan 5 formulasi. Pembentukan nanopartikel perak ditandai dengan perubahan dari tidak berwarna menjadi kuning kecoklatan, panjang gelombang 537,0 nm, dan absorbansi 1,276. Ukuran partikel  $92,90 \text{ nm} \pm 1,15$ , nilai PI  $0,379 \pm 0,028$ , dan zeta potensial  $-38,8 \text{ mV} \pm 0,64$ . Gugus fungsi yang terbentuk menandakan ikatan -OH, C=O, N=O pada bilangan gelombang 3325,04; 1634,55; dan  $1370,06 \text{ cm}^{-1}$ . Memiliki bentuk morfologi kubus yang seragam. Hasil uji aktivitas antibakteri menunjukkan zona hambat yang bersih dan jelas sebesar  $13,7 \text{ mm} \pm 1,5$  terhadap bakteri *Staphylococcus aureus*.

**Kesimpulan:** Nanopartikel perak yang disintesis oleh isolat bromelain buah nanas telah memenuhi persyaratan nanopartikel perak yang baik dan memiliki aktivitas antibakteri.

Kata kunci: *Isolat bromelain buah nanas, nanopartikel perak, antibakteri.*

**BIOSYNTHESIS AND CHARACTERIZATION OF SILVER  
NANOPARTICLES FROM BROMELAIN ISOLATE OF PINEAPPLE  
FRUIT (*Ananas comosus* L.Merr) AS ANTIBACTERIA**

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**ABSTRACT**

**Background:** Pineapple (*Ananas comosus* L. Merr) has been used as an antioxidant, anti-inflammatory, and antibacterial. There has been a lot of research related to its antibacterial test by the active compounds of bromelain enzymes. Supported by silver nanoparticle technology with high bactericidal activity because silver ions can effect bacterial cell death, as well as nanoparticle size that can increase drug bioavailability.

**Purpose:** This study aims to synthesize and characterize silver nanoparticles from bromelain isolate of pineapple fruit and test the antibacterial activity of silver nanoparticles.

**Methods:** Isolation was carried out to obtain bromelain enzyme isolates, isolates were tested for calculating bromelain content by spectrophotometry. The biosynthesis of silver nanoparticle was made by varying the number of isolates, silver nitrate solution, and PVA by ultrasonication method. Furthermore, characterization was carried out by visual observation, observation of wavelength, determination of particle size, polydispersity index, zeta potential, determination of functional groups by FTIR, and morphological evaluation by SEM. Then, the antibacterial activity of the diffusion method was tested against *Staphylococcus aureus* bacteria.

**Results:** Obtained 5 formulations. The formation of nanoparticles was characterized by a change from colorless to brownish yellow, a wavelength of 537.0 nm, and an absorbance of 1.276. The particle size was  $92.90 \text{ nm} \pm 1.15$ , the PI value was  $0.379 \pm 0.028$ , and the zeta potential was  $-38.8 \text{ mV} \pm 0.64$ . The functional group formed indicates  $-\text{OH}$ ,  $\text{C}=\text{O}$ ,  $\text{N}=\text{O}$  at wave number 3325.04; 1634.55; and  $1370.06 \text{ cm}^{-1}$ . It has a uniform cuboidal morphology. The results of the antibacterial activity test showed a clean and clear inhibition zone of  $13.7 \text{ mm} \pm 1.5$  against *Staphylococcus aureus* bacteria.

**Conclusion:** Silver nanoparticles synthesized by bromelain isolate of pineapple fruit have the requirements for good silver nanoparticles and had antibacterial activity.

**Keywords:** *Bromelain isolate of pineapple fruit, silver nanoparticles, antibacterial.*