

# Sintesis nanomaterial Bi<sub>2</sub>O<sub>3</sub>-WO<sub>3</sub> menggunakan ekstrak daun yodium jatropha multifida dan aktifitas fotokatalisisnya terhadap malachite green = Synthesis of Bi<sub>2</sub>O<sub>3</sub>-WO<sub>3</sub> nanomaterials using yodium leaf extract jatropha multifida and their photocatalytic activity toward malachite green

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## Abstrak

### <b>ABSTRAK</b><br>

Nanomaterial Bi<sub>2</sub>O<sub>3</sub>-WO<sub>3</sub> disintesis menggunakan ekstrak daun yodium Jatropha multifida yang mengandung alkaloid sebagai sumber basa dan saponin sebagai surfaktan alami. Nanopartikel hasil sintesis dikarakterisasi dengan X-ray diffraction XRD , Fourier transform infrared FTIR , PSA, Spektrofotometer UV-Visible UV-Vis , Scanning electron microscope SEM , dan Transmission electron microscopy TEM . Karakterisasi dengan XRD menunjukkan bahwa Bi<sub>2</sub>O<sub>3</sub> memiliki struktur kristal monoklinik, WO<sub>3</sub> memiliki struktur kristal triklinik, dan nanomaterial Bi<sub>2</sub>O<sub>3</sub>-WO<sub>3</sub> memiliki struktur tetragonal. Berdasarkan hasil karakterisasi TEM, nanomaterial Bi<sub>2</sub>O<sub>3</sub>-WO<sub>3</sub> memiliki ukuran 45,58 nm dengan energi band gap sebesar 2,86 eV. Aplikasi aktivitas fotokatalitik malachite green diamati pada daerah sinar tampak. Persentase degradasi malachite green dengan nanopartikel Bi<sub>2</sub>O<sub>3</sub>, WO<sub>3</sub>, dan nanomaterial Bi<sub>2</sub>O<sub>3</sub>-WO<sub>3</sub> masing-masing adalah 9,24 ; 30,59 ; dan 94,79 selama 2 jam waktu penyinaran.

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### <b>ABSTRACT</b><br>

Synthesis nanomaterials Bi<sub>2</sub>O<sub>3</sub> WO<sub>3</sub> was successfully performed using yodium leaf extract Jatropha multifida with alkaloid for a base source and saponin as biosurfactant. The synthesized nanoparticles and nanomaterials were characterized with X ray diffraction XRD , Fourier transform infrared FTIR , PSA, Spectrophotometry UV Visible UV Vis , Scanning electron microscope SEM , and Transmission electron microscopy TEM . Characterization with XRD shows that nanoparticles Bi<sub>2</sub>O<sub>3</sub> have a monoclinic crystal structure, WO<sub>3</sub> have a triclinic crystal structure, and nanomaterials Bi<sub>2</sub>O<sub>3</sub> WO<sub>3</sub> have a tetragonal crystal structure. Based on TEM characterization, size of nanomaterials Bi<sub>2</sub>O<sub>3</sub> WO<sub>3</sub> is 45.58 nm with band gap energy of 2.86 eV. Activity photocatalytic of application malachite green were observed using visible light radiation. Percentage of degradation malachite green with nanoparticles Bi<sub>2</sub>O<sub>3</sub>, WO<sub>3</sub>, Bi<sub>2</sub>O<sub>3</sub> WO<sub>3</sub> nanomaterials were 9.24 30.59 and 94.79 for 2 hours.