

Supplementary Information

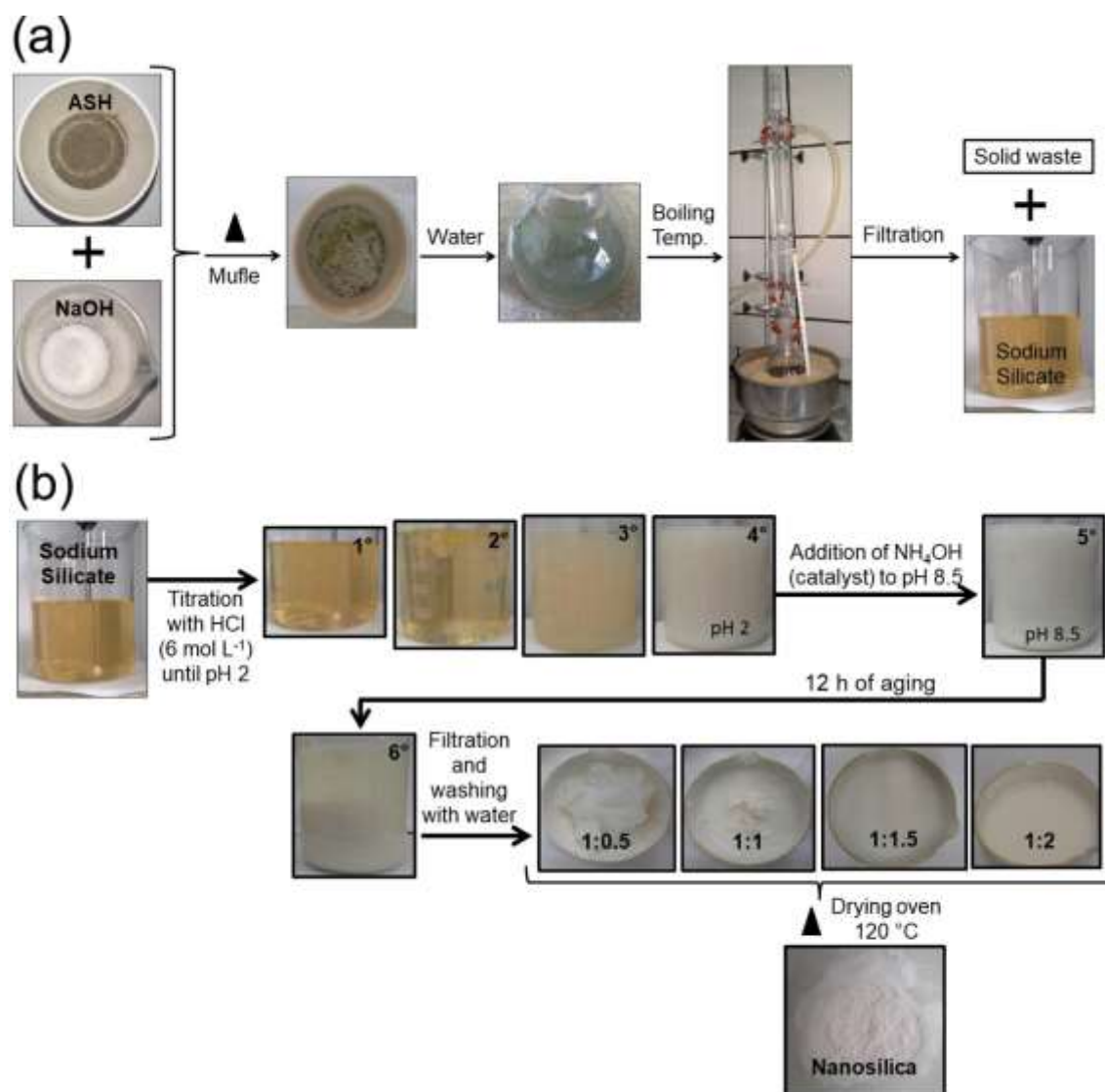
An Alternative and Simple Method for the Preparation of Bare Silica Nanoparticles Using Sugarcane Waste Ash, an Abundant and Despised Residue in the Brazilian Industry

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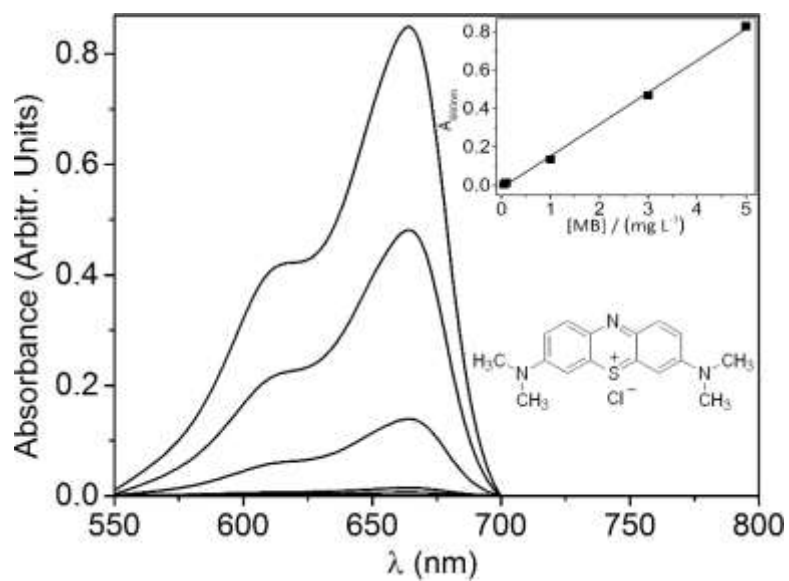


Figure S2. UV-Vis spectra of the solution containing methylene blue (MB) at concentrations from 0.050 to 5.00 mg L⁻¹ ($\lambda = 660$ nm). Insert: analytical curve of MB.

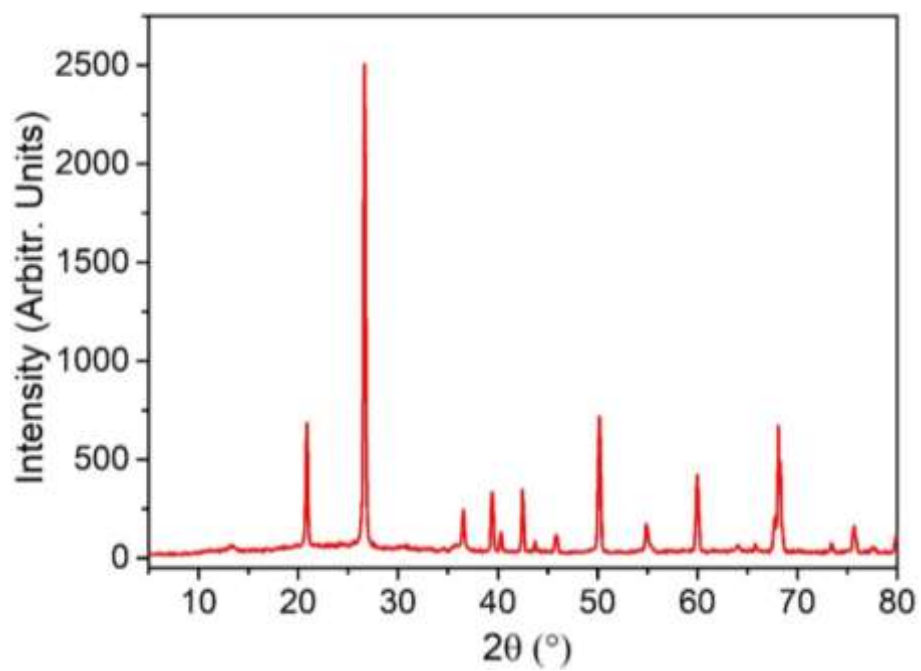


Figure S3. XRD patterns of the sugarcane waste ash.

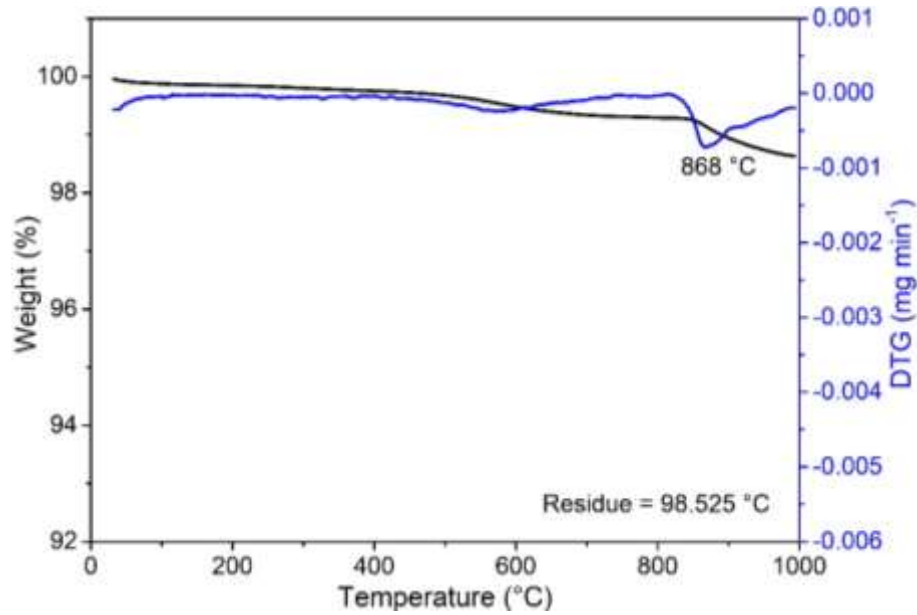


Figure S4. TG and DTG curves of the sugarcane waste ash. The measures were performed under N₂.

Analyzing the thermogravimetric analyses (TG) and derivative thermogravimetric analysis (DTG) curves of Figure S4, a first mass loss between 32 and 100 °C corresponds to the loss of moisture. The second stage of decomposition occurs between 100 and 443 °C due to the loss of organic components.¹ The third loss occurs between 443 and 833 °C due to the surface dehydroxylation reaction.² The fourth stage of decomposition occurs between 833 and 1000 °C, with maximum mass loss peak at 868 °C, this is attributed to the structural rearrangement that begins with the heating of mineral quartz.³

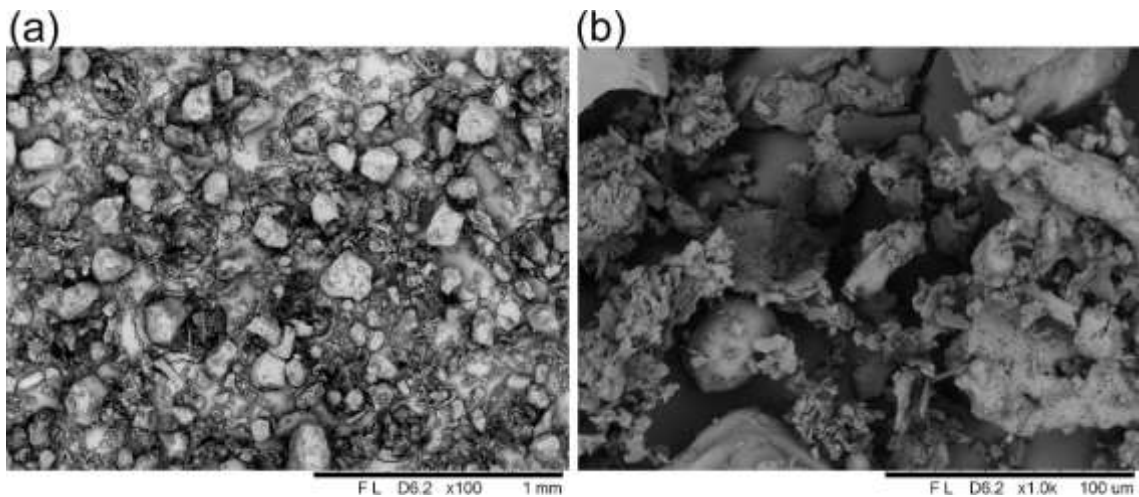


Figure S5. SEM images of the sugarcane waste ash. (a) 100× magnification; (b) 1000× magnification.

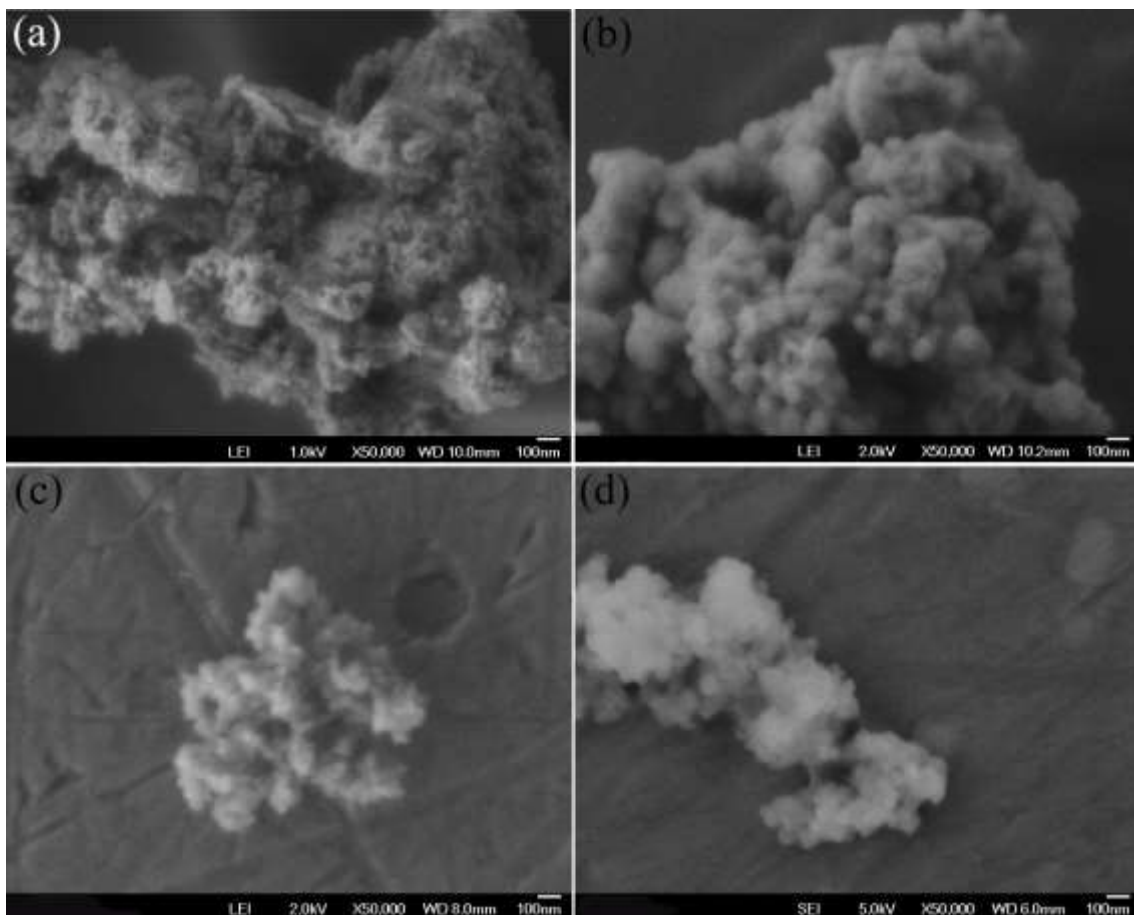


Figure S6. SEM images of the (a) SiO₂NPs 1:0.5; (b) SiO₂NPs 1:1; (c) SiO₂NPs 1:1.5; (d) SiO₂NPs 1:2.

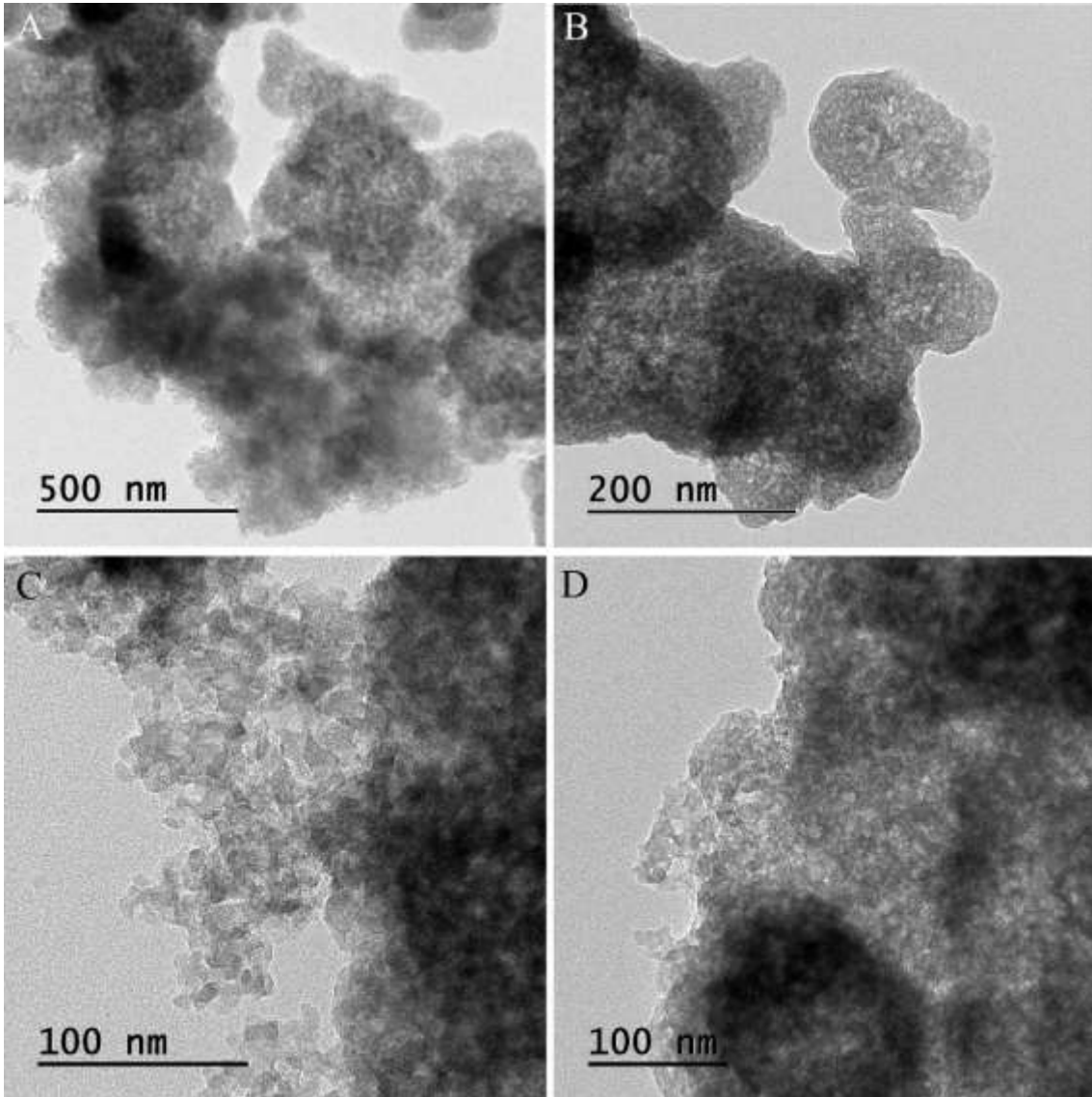


Figure S7. TEM images of the SiO₂NPs 1:1.5.

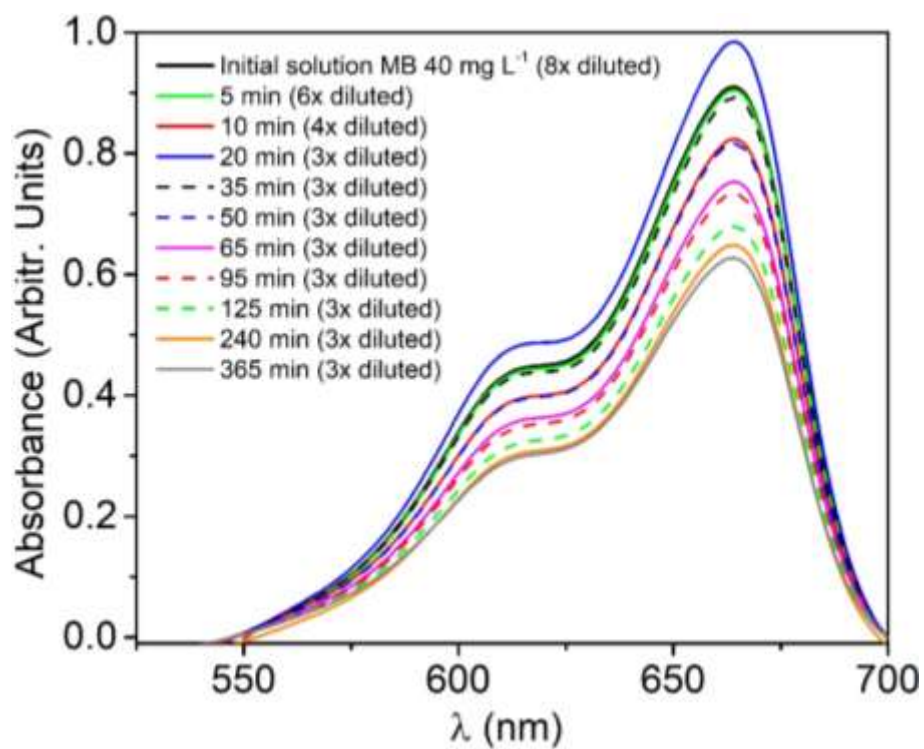


Figure S8. UV-Vis spectra before methylene blue dye adsorption, and after methylene blue adsorption at 25 °C. Initial solutions 40 mg L⁻¹.

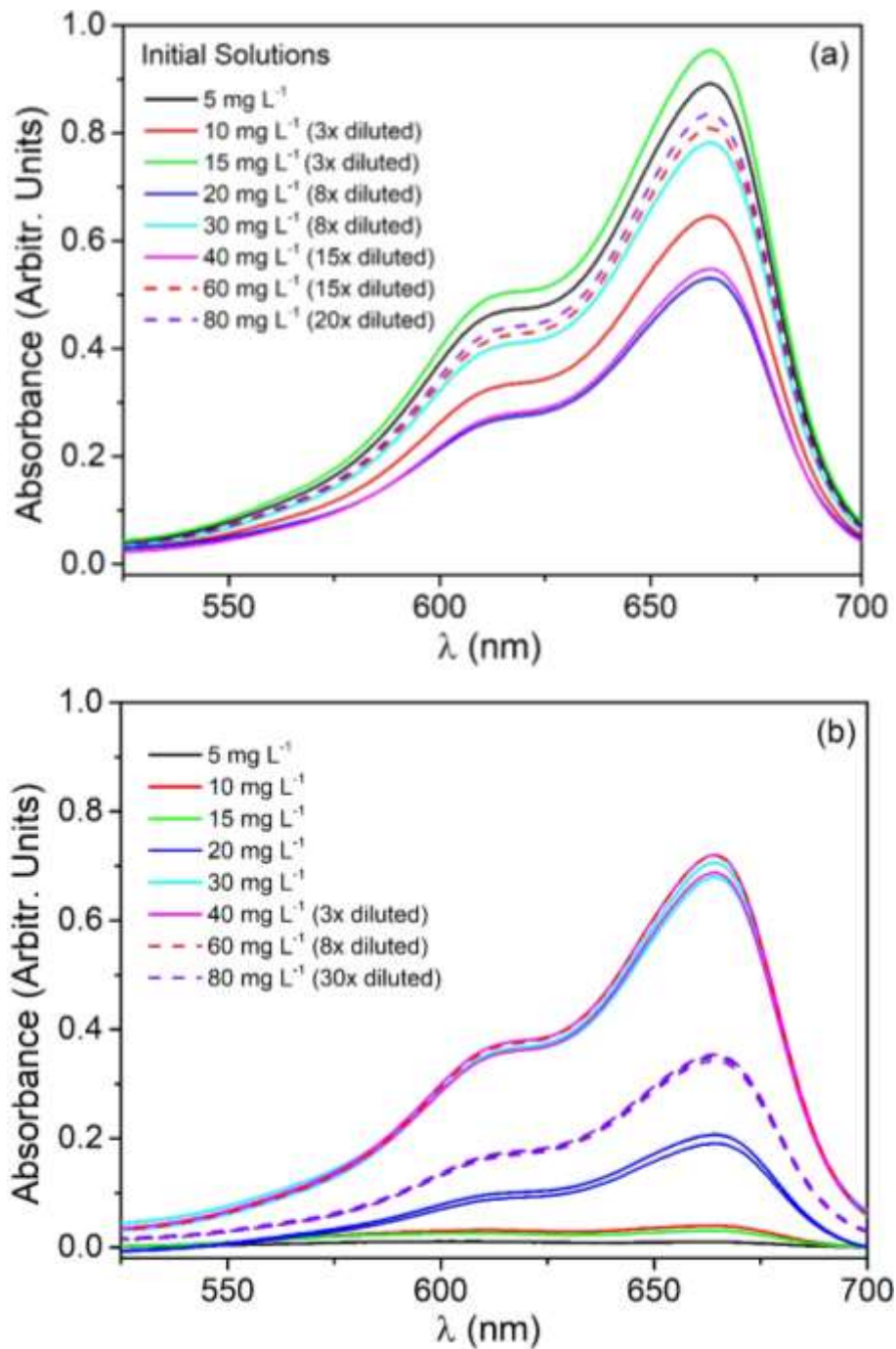


Figure S9. UV-Vis spectra (a) before MB dye adsorption, initial solutions 5 to 80 mg L⁻¹; (b) after MB adsorption at equilibrium time 2 h, 25 °C isotherm. Samples in triplicate.



Figure S10. Image of samples of MB adsorption at equilibrium time 2 h, and 25 °C. Initial solutions (a) 5 mg L⁻¹; (b) 10 mg L⁻¹; (c) 15 mg L⁻¹; (d) 20 mg L⁻¹; (e) 30 mg L⁻¹.

References

1. Mourhly, A.; Khachani, M.; Hamidi, A. E.; Kacimi, M.; Halim, M.; Arsalane, S.; *Nanomater. Nanotechnol.* **2015**, *5*, DOI: 10.5772/62033.
2. Franken, L.; Santos, L. S.; Caramão, E. B.; Costa, T. M. H.; Benvenutti, E. V.; *Quim. Nova* **2002**, *4*, 563.
3. Jagadesh, P.; Ramachandramurthy, A.; Murugesan, R.; Sarayu, K.; *Sadhana* **2015**, *40*, 1629.