

Adsorption of Industrial Dyes onto Acid-modified Banana Pseudo Stem Biomass (BPSB)

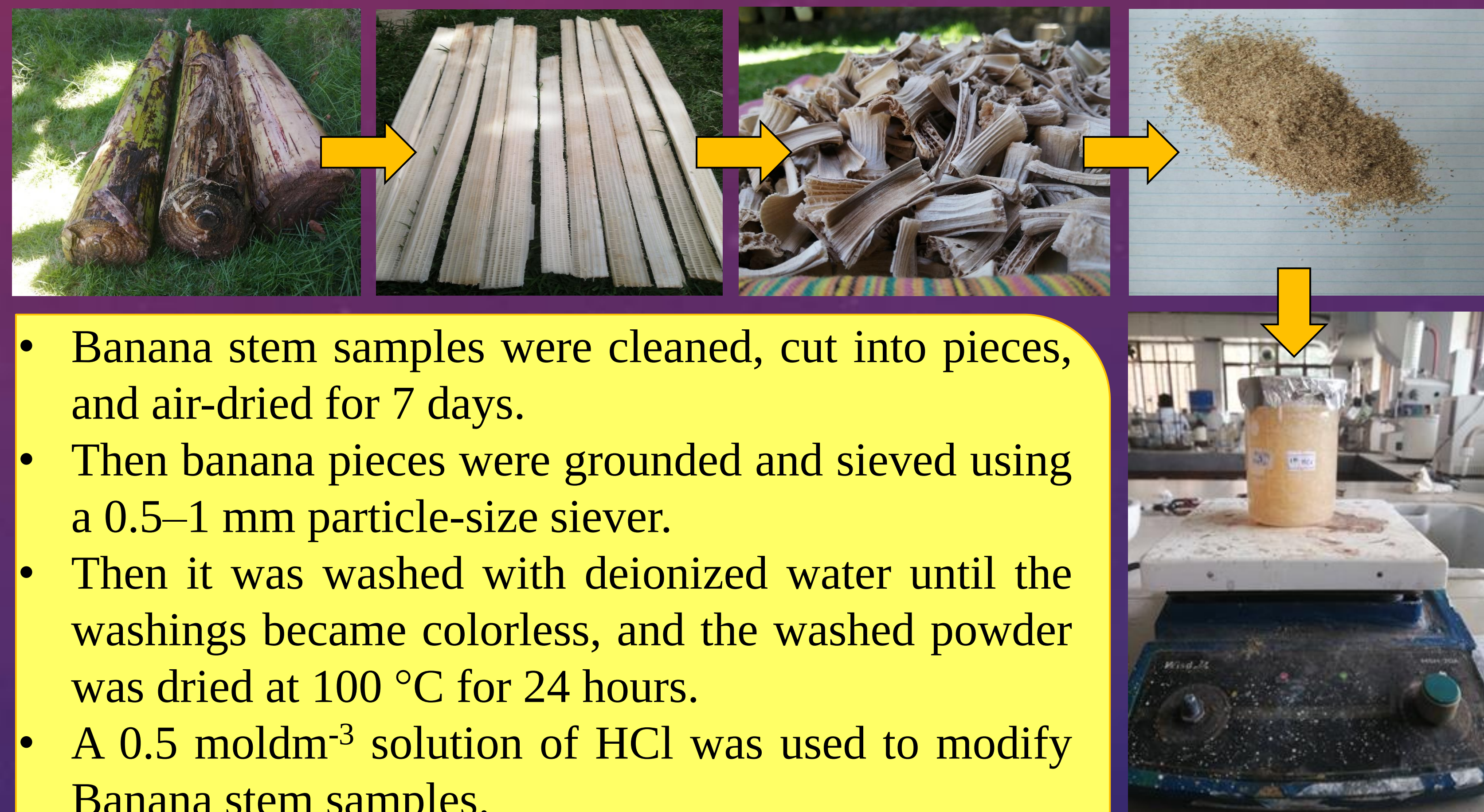
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Introduction

- Water pollution, major branches of environmental pollution, is mainly due to industrials effluents discharge into the natural water bodies.
- Chemical, physical, and biological methods available for the treatment of such effluents before discharge into the water bodies.
- Due to the high production cost low cost and readily available biomass have been tested as promising adsorbents.
- Banana Pseudo Stem Biomass (BPSB) is an agricultural waste containing 46% cellulose, 38% hemicellulose, and 8% lignin.
- This study is focused on developing an adsorbent using BPSB to treat contaminated waste water.

Methodology

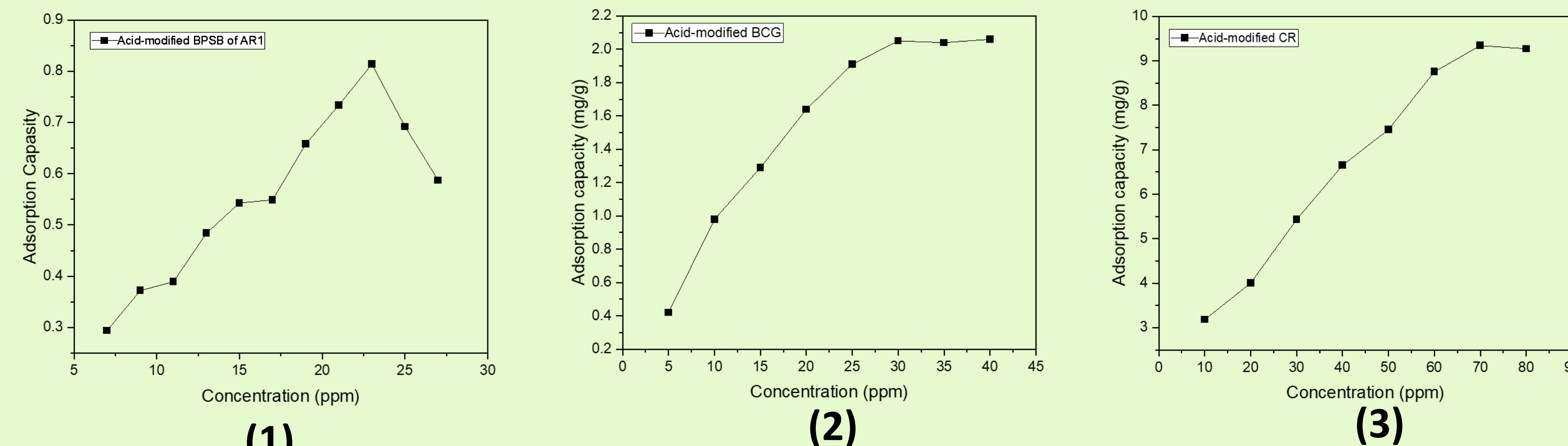


- Banana stem samples were cleaned, cut into pieces, and air-dried for 7 days.
- Then banana pieces were grounded and sieved using a 0.5–1 mm particle-size sieve.
- Then it was washed with deionized water until the washings became colorless, and the washed powder was dried at 100 °C for 24 hours.
- A 0.5 moldm⁻³ solution of HCl was used to modify Banana stem samples.

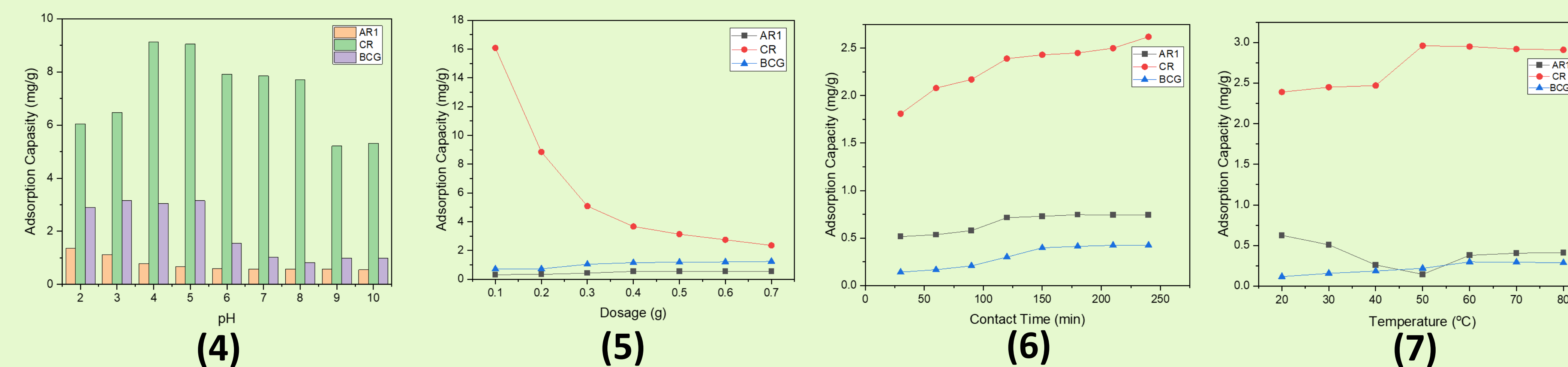
Abbreviations; AR 1 – Acid Red, BCG – bromocresol green, CR – Congo Red, SEM – Scanning Electron Microscope

Results

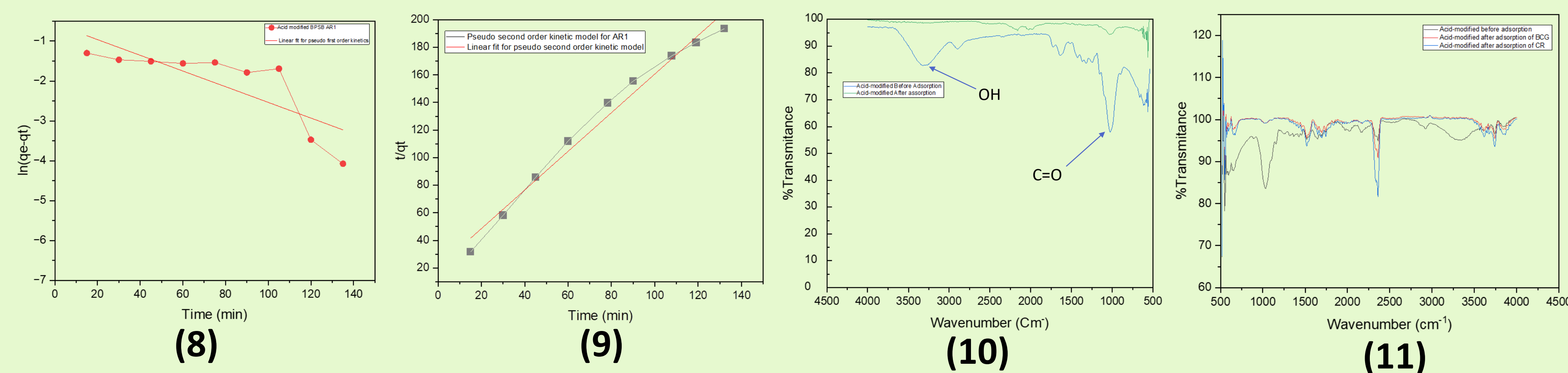
The effect of Concentration, pH, dosage, contact time, and temperature are shown by below graphs



Figures; Effect of Concentration (1) AR 1 (2) BCG (3) CR

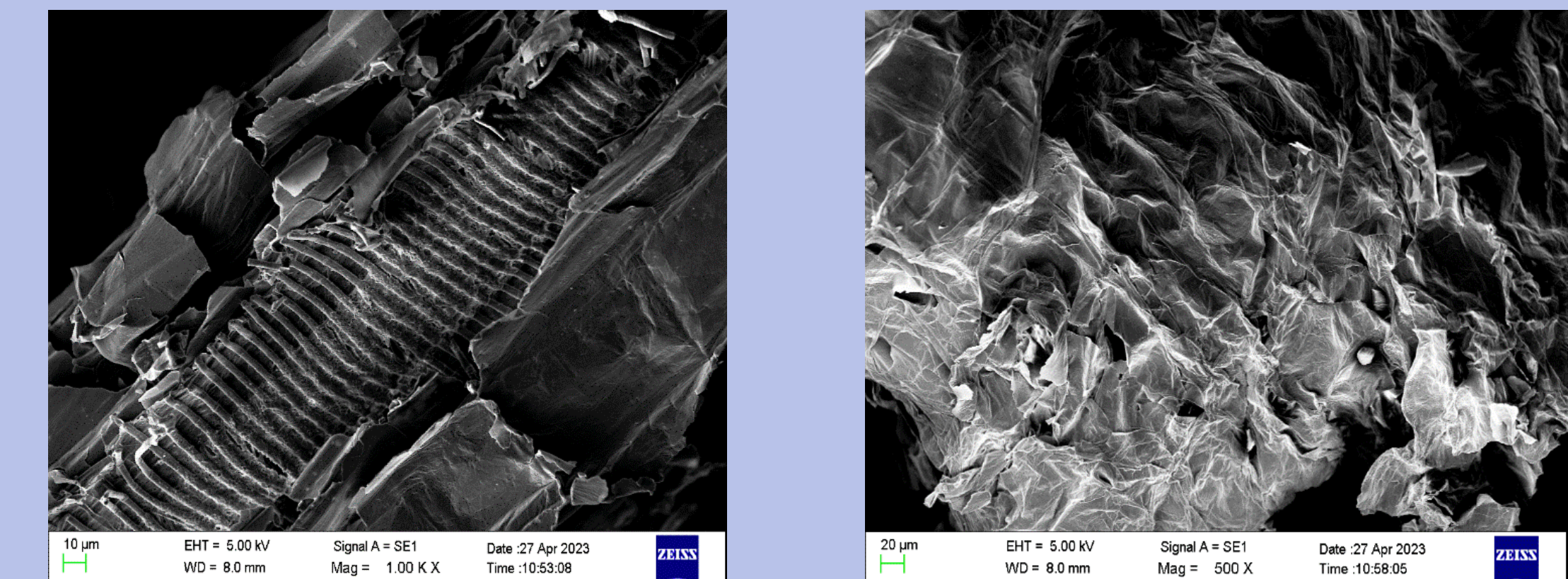


Figures; Effect of (4) pH (5) Dosage (6) Contact Time (7) Temperature



Figures; Effect of Kinetic Model (AR1) (8) Pseudo first order (9) Pseudo second order

Figures; (10), (11) FT-IR analysis



Figures; SEM analysis (12) before adsorption of AR 1 (13) after adsorption of AR 1

Conclusion

- Study demonstrates that BPSB can be used as an alternative for organic dye adsorption.
- AR1 shows maximum adsorption capacity at 23 ppm while BCG and CR have the optimum values given as 25 ppm and 60 ppm.
- By analysing functional group moieties OH and C=O were present in the BPSB samples.
- The surface becomes more homogeneous after adsorption by analysing SEM analysis.

References

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