

Adsorption of natural pigments of mushroom wastes using a heavy metal-nickel

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INTRODUCTION & AIM

Agricultural waste management is crucial to the scope of the zero-waste strategy.

Cotton, rice, and mushrooms are agricultural materials that produce waste.



After its harvesting, 70% of the edible mushrooms are released as waste.

Mushroom waste can be utilized in fertilising, animal feeding, energy, and wastewater treatment applications.

Figure 1. The importance of removing edible mushroom waste [1]

- Mushrooms have natural pigments to be utilized in pharmaceutical, cosmetic, food, and textile industries [2].
- This study adopted an unusual approach. A heavy metal was used as an adsorbent to remove the natural dye of spent mushrooms.

METHOD



Figure 2. Photos represented the spent mushroom collection and adsorption

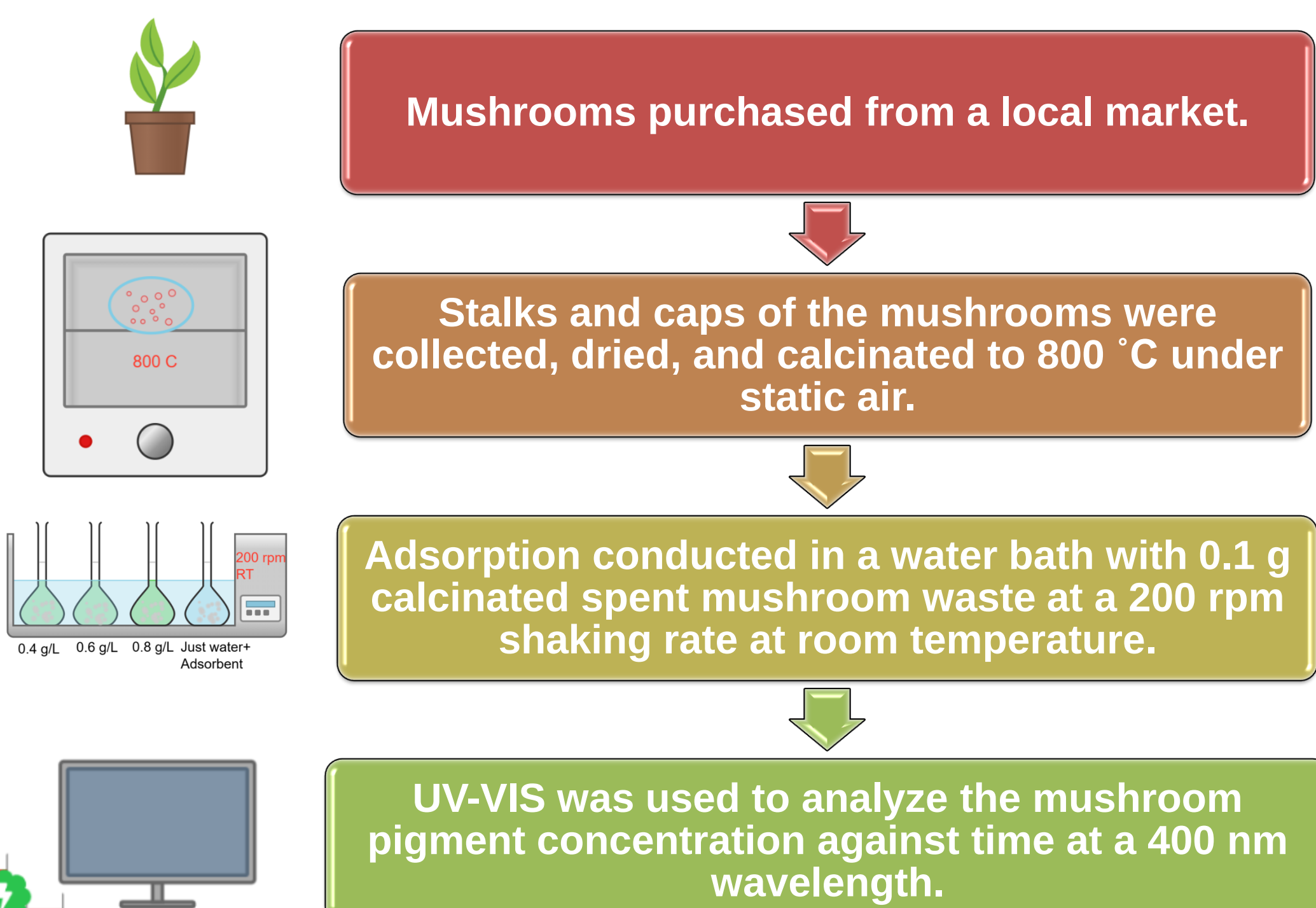


Figure 3. The details for the method used in the study

RESULTS & DISCUSSION

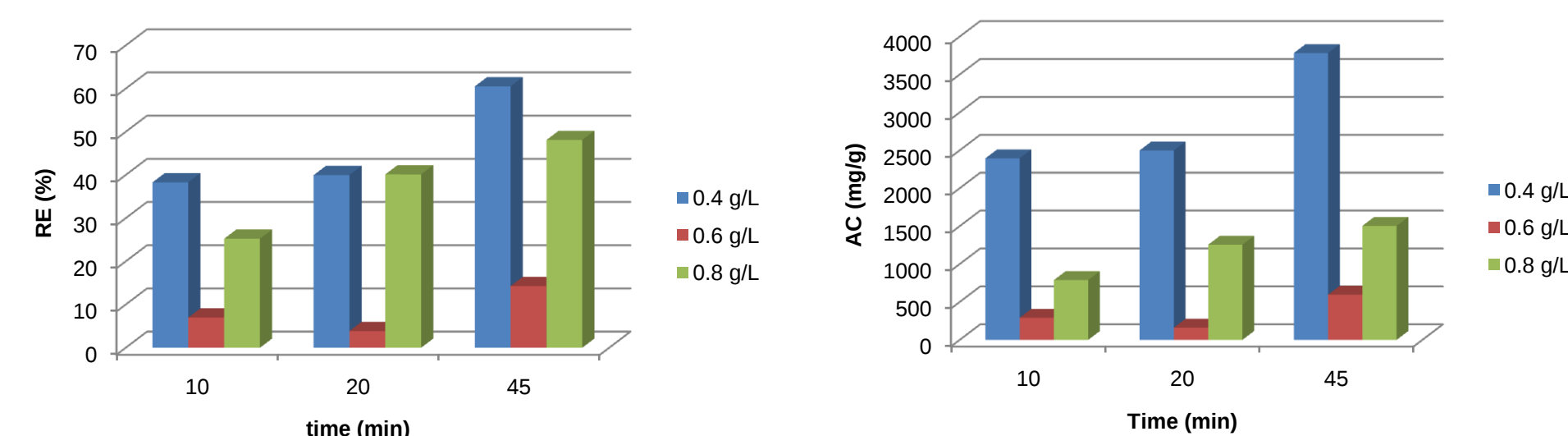


Figure 4. Removal Efficiency (RE, %) and Adsorption Capacity (AC, mg/g) values for different initial Ni(II) solution concentrations

- Maximum RE and AC values were obtained at 0.4 g/L Ni(II) solution concentration and 45 min adsorption time, as 61% and 3783 mg dried mushroom pigment/g Ni(II).
- The most suitable kinetic model for all studied initial Ni(II) solution concentrations was determined as Pseudo 2nd Order ($R^2 \geq 0.9$).

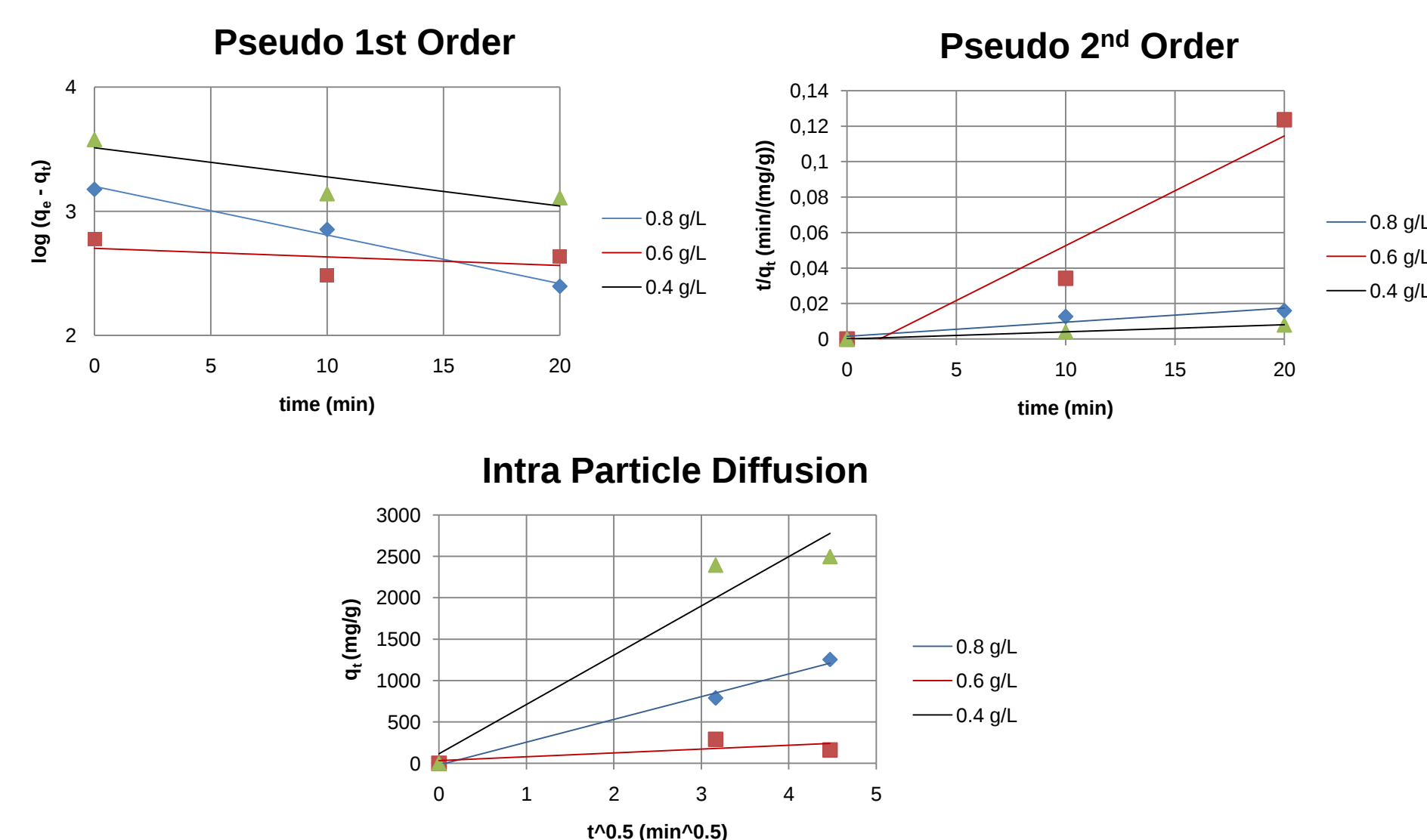


Figure 5. Determination of the most suitable kinetic model with the data

Table 1. Calculated R^2 values for the selected models

Kinetic Model	0.4 g/L	0.6 g/L	0.8 g/L
Pseudo 1st Order	0.803	0.222	0.990
Pseudo 2nd Order	0.999	0.938	0.896
Intra Particle Diffusion	0.937	0.536	0.992

CONCLUSION & FUTURE WORK

- Utilizing both an agricultural waste and a heavy metal in the adsorption seemed like an environmentally friendly solution to degrade waste pollution.
- The following studies will be about desorbing the natural dye from the adsorbent Nickel.
- Other metals can be utilized for removing pigments of Mushroom waste from the water.

REFERENCES

- [1] Umor et al. (2021). *Journal of Material Cycles and Waste Management*, 23(5), 1726-1736.
- [2] Téllez-Téllez & Díaz-Godínez (2022). *Biomolecules from natural sources: Advances and applications*, 82-100.