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Novel magnetic coffee waste nanocomposite as effective bioadsorbent for Pb(II) removal from aqueous solutions

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Highlights

- A low cost magnetic adsorbent was successfully synthesized from coffee waste by embedding Fe₃O₄ nanoparticle.
- Effect of Fe₃O₄ loading onto coffee waste was evaluated for Pb (II) removal.
- Adsorption data fitted best with Langmuir model and followed pseudo-second order kinetics indicating chemisorption.
- Maximum monolayer adsorption capacity for Pb (II) at 25°C was 41.15 mg/g.
- Thermodynamic analysis revealed that sorption is endothermic and spontaneous in nature.
- Oxygen rich surface functional group plays an important role in enhancing the adsorption capacity.

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