

A Heavy Metal Extraction Process to Clean Contaminated Water Using Tannin-Embedded Biopolymers

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Problem: Heavy Metal Contamination

Globally, and locally in northern Ontario, the proliferation of **mining and smelting** operations continues to occur.

Contaminates fresh drinking water!

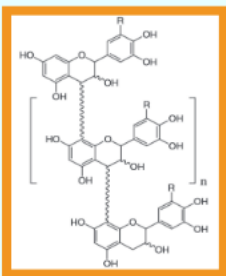


Heavy metals cause adverse health effects:

- reduced growth and development
- organ and nervous system damage
- cancer
- death



Solution: Tannin-Embedded Biopolymers (TEB)



Molecular Structure of Tannin

What is a TEB?

A TEB is a starch-based eco-friendly biopolymer combined with tannins (oak leaves).



Tannin Embedded Biopolymers



Results

Fe, Cu, and Zn solutions were individually tested. TEBs were added to some solutions. These solutions were compared against a solution without the TEBs. Results were measured in **mass, clarity, concentration, and germination.**



A TEB after in the metal solution



Conclusion

Using a TEB is an **economically and eco-friendly** way to remove heavy metals from water.

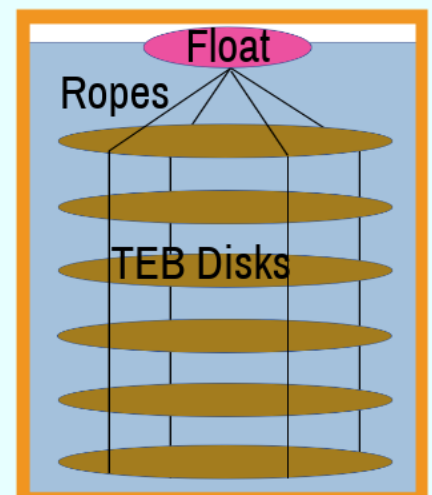
The experiment showed that the tannins **chemically bonded** with the heavy metal ions and attached to the biopolymers.



Applications

Ring of Fire:

The Ring of Fire will be a huge **mining and smelting** operation in 2024. TEBs could be used as a preventative measure to protect one of the **world's largest sources of drinking water.**



Can be used in **ponds or lakes.**