Cadmium Removal from Water with a Corn Biosorbent

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Importance of clean water

- Mine spills effecting rural commutes
  - Chenzhou mine spill (China)
  - Tar Creek superfund site
  - Kings mine spill
    - Cd 36.1 μg/L to 138 μg/L
- Cadmium health effects
  - Short term exposure:
    - nausea, vomiting, diarrhea, muscle cramps, sensory disturbances, liver injury and renal failure
  - Long term exposure:
    - kidney, liver, bone and blood damage
Bio-sorbents?

- Biosorbents- tiny particles of any biological component that remove metals or nonmetals from a solution.
- United States produces 120 million tons of biomass residue per year.
- Corn is a possible economically way to remove heavy metals from water.

**Question:** Do corn cobs work as a viable biosorbent to remove Cadmium from contaminated waters?
Data collection
10 ug/l
25 ug/l
80 ug/l
Analysis

Calibrated data points

<table>
<thead>
<tr>
<th>Ci (ug/L)</th>
<th>Test 1</th>
<th>Test 2</th>
<th>Test 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>11.08</td>
<td>7.13</td>
<td>14.41</td>
</tr>
<tr>
<td>25</td>
<td>14.67</td>
<td>33.41</td>
<td>14.41</td>
</tr>
<tr>
<td>80</td>
<td>42.95</td>
<td>28.84</td>
<td>45.52</td>
</tr>
</tbody>
</table>
Conclusion

- For higher concentrations corn is a viable biosorbent
- Lower concentration did not see large sorption rates.

Is a viable bio sorbent for Cd but further research could be done on different parts of the corn and other heavy metals.

<table>
<thead>
<tr>
<th>Initial concentration (ug/L)</th>
<th>Removal/Absorption Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>9.0%</td>
</tr>
<tr>
<td>25</td>
<td>41.8%</td>
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<tr>
<td>80</td>
<td>51.1%</td>
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</tbody>
</table>
Special thanks to
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Any Questions?