

Transformation and use of lignin from black liquor as a flocculating agent in wastewater treatment

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The more technology advances, the more environmental issues we confront, such as water scarcity and the growth of waste production. It is known that by the year 2025, 1.8 billion people will be faced with absolute water scarcity and 2/3 of the world will experience water-stressed conditions. Furthermore, the production of the waste is growing much faster than expected, especially in some countries which the waste management system doesn't work properly, such as Brazil.

Brazil is a big country, with a population over 200 million inhabitants. Even though Brazil has a lot of natural resources, the bad distribution and misuse of them are ruining the country. More than 850 cities in Brazil nowadays suffer with lack of water. Also, less than 50 years ago, the population was less than half of now. With a fast growing population, the need to meet sanitation demand also grows.

Energy recovery processes are becoming popular, like waste-to-energy, in which you generate electricity and/or heat using waste. But what if we could supply a better need using waste? Such as generating drinkable water? First it is needed to know how we can generate clean water. Wastewater treatment has several steps and one of them is called flocculation, which is a chemical process. After a chemical is added, particles will clump together in the water and then, the clean water can be removed.

A unique approach using waste for wastewater treatment is being investigated in Brazil at Universidade Federal de Santa Maria. Paper factories generate a lot of waste during the fabrication process. This waste is called black liquor, which one of the main compounds is called lignin. A slightly change in the lignin can turn it into a modified organic flocculant for water treatment. Preliminary findings have shown that the black liquor we've used contains around 22% lignin. Only the Brazilian company Suzano Pulp and Paper is capable of producing 20,000 tonnes of lignin per year.

São Paulo is a megacity in Brazil with over 10 million inhabitants, with a lot of factories, including the headquarters of Suzano. It is also an overpopulated city which can't provide sanitation and drinkable water for everyone. What if the company invested in reusing part of the water they use in the factory by treating it themselves? What if other companies and other countries started to do the same? It could be a start for minimize the problems we have, to increase the number of people with access to clean water. Further studies shall be investigated to determine the costs and benefits of this approach. Meanwhile, it offers an example of a creative reuse of waste that allows less intensive of chemicals, and a more organic approach to water treatment.