The research done in this study aims to prove that polyurethane foam can be a cost-efficient way to remove arsenic from drinking water. Arsenic contamination in drinking water is a worldwide problem that causes much death and diseases per year. For this reason, research is being done on how to remove arsenic from water in a safe and efficient manner.

**Figure 1:** Estimated Risk of Arsenic in Drinking Water

**Current Problem**

The current problem is that the polyurethane foam is collapsing after its expansion. Our goal is to have a foam that only collapses 10-15 mm after expansion and consists of an interconnect cell structure that allows water flow through it.

**Methods**

The mixture of polyurethane foam consists of polypropylene glycol (PPG), toluene di-isocyanate (TDI), surfactant, deionized water and iron oxide nanoparticles. The polypropylene glycol is baked at 75°C and -25mmHg in the vacuum furnace seen in Figure 3. After baking for 24 hours the PPG is combined with TDI in the lab set up seen in Figure 4. After 4-5 hours the mixture is taken out of the flask and the last three components are added in. It is known that when making polyurethane foam, cell structure collapse can commonly be from too much deionized water. Because of this, I tried 4 different ratios of deionized water to the mixture. The permeability of each foam sample was then tested to see which amount of deionized water was best (Figure 5).

**Results/Next Steps**

After completing 4 trials, each with a different ratio of deionized water, the ratio of 5g of deionized water to 68g of the mixture was determined to be the optimal amount of deionized water. In Figure 6 you can see two samples of foam that were created. The sample on the right expanded 400-500% its original volume and then collapsed less than 15mm. This was deemed a success. The next step in this research is to optimize the amount of surfactant. After the process for creating polyurethane foam with the right cell structure a sample will be inserted into the filter in Figure 7. Arsenic water will be pumped through the filter and the effectiveness of the polyurethane foam with iron oxide nanoparticles will be determined.

**Conclusions**

If this research is successful, polyurethane foam will be proven to be both a safe and cost-effective way to remove arsenic from water. This will lead to less health complications due to the consumption of arsenic.

**References**


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