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Effectiveness of Muslin Fabric Filtration for Drinking Water Treatment in Developing Countries

About one billion people in developing countries lack effective and inexpensive ways to filter their water supply. Some people filter water through the fabric of their clothing (called fabric filtration). Little work has been done to apply the scientific method to optimize fabric filtration. In this work, laboratory experiments were conducted to quantify the extent to which different types of fabric removed turbidity from different water sources. These experiments involved testing several types of muslin fabric and measuring the influent turbidity, effluent turbidity, water flow rate, and hydraulic conductivity of the fabric. Independent variables included the numbers of layers (1 to 8), fabric type (bleached and non-bleached), initial water turbidity, and fabric thread count. As expected, the most effective filtration was achieved with the highest number of layers of high-thread-count fabric. Unbleached fabrics typically showed better performance than bleached fabrics. The percent turbidity remaining after filtration decreased exponentially with the number of fabric layers, in accordance to filtration theory through granular media. Unexpectedly, it was observed that the turbidity removal increased with increasing influent volume. This could be due to “filter ripening”. A sequential filtration experiment was performed in which 8 layers were used with one test involving a low-thread-count fabric and another with a high-thread-count fabric. The high-thread-count fabric removed the turbidity more efficiently than the low-thread-count fabric. It was observed that sequential filtration had a higher turbidity removal than filtering the water just once through 8 layers of the fabric. The data obtained can be used to empower people in developing countries in providing safe drinking water for themselves.

Key words: Muslin fabric, turbidity, fabric filtration, sequential filtration, thread count