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Putting the Cap on Pollution

The air we breathe is so polluted that 40% of deaths, worldwide, are caused by air pollution. The major components of air pollution are particulate matter and sulfur dioxide; both are emitted by burning coal. The main sources of these are coal burning power plants and trains. My project involves making and testing filters for smokestacks for coal burning power plants and coal burning trains. I tested four types of filter medium: cotton balls, brushed cotton fiber, steel wool, and sheep's wool. I built a small smokestack, built a fire and burned coal. I placed the filters over the smokestack for five minutes using each medium, one at a time. In my first experiment I used paper above the filter to capture the smoke that passed through the medium. I expected the paper to collect smoke, but didn't see any. I decided to do a second experiment. In my second experiment I weighed each medium before and after testing to see if they gained any weight from the smoke. I expected them to gain weight but in fact they lost weight. This might have been caused by moisture being removed through evaporation during the test. To prove this theory I designed a third experiment applying heat to the medium without smoke. There was no change in the weight of the filters. Finally I applied an alcohol wash, an effective solvent for smoke, to each medium, and observed the change in color of the alcohol. The sheep's wool had the most change in color, making it the most effective filter.