

Regional Science Consortium

Microplastics Filter Engineering Challenge

Background

Much of our clothing is composed of materials such as polyester, nylon, acrylic, and polyamide. All of these materials are actually plastics and release microfibers (microplastics) when they are washed. These fibers travel from the water in your washing machine out into the environment. In order to prevent this release of plastic fibers into the environment, we can purchase clothing made of natural, biodegradable materials such as cotton. Additionally, we can attach a filter to the hose of the washing machine which will capture fibers.

Objective

Students will build a filter for the hose of a washing machine to prevent the release of microplastics into the environment. They must consider that the water must be able to flow easily through the filter, so the washing machine does not get clogged or backed up. Students will determine which provided mesh or combination of meshes will make the best filter by completing several trials with different materials.

Instructions

1. Divide students into 15 groups or less.
2. Distribute supplies to each group as follows:
 - a. One water sample (dryer lint sample filled with water)
 - b. One clear plastic cup
 - c. One rubber band
 - d. One datasheet
 - e. A variety of mesh
3. Students will layer mesh and secure it over the opening of the water sample using the rubber band.
4. Once mesh is secure, quickly turn the water sample over using the plastic cup to catch sample contents.
5. Observe and record the water flow rate and the percentage of microfibers removed.
6. After each trial, return the sample contents to their original bottle making sure to remove all fibers and water from the filter and plastic cup.
7. Continue testing the filter with two more trials then find the average percentage and flow rate for that filter.
8. Repeat steps 3-7 for each filter. Complete the questions at the bottom of the worksheet.
9. Compare results and determine which filter design was the most efficient within each group, and then for the class as a whole.