

Science: Properties of Wool

Part of the EarthLoom® lesson plans.

Wool is special

1. Why is wool so widely used?
 - a. Absorbs moisture
 - i. Middle Eastern tribes used a wool fleece to collect dew overnight. They would wring the water out of the fleece in the morning (you had to acquire a taste for it, but if you are thirsty enough, it will taste wonderful)
 - ii. The surface of wool is water resistant, especially with its natural coating of lanolin, but its core is highly absorbent, absorbing as much as 30 percent of its weight without feeling wet to the touch.
 - iii. Cotton absorbs 8% of its weight, synthetics 5% or less.
 - b. Insulates against heat and cold
 - i. Cotton sheets feel cool to the touch
 - ii. Fleece flannel feels warm
 - iii. Wool warms you even when it is wet. A wet wool sweater will keep you warm. A wet cotton sweater will give you hypothermia.
 - c. Resists flame
 - i. The presence of water in the fiber plus the protein keratin (the same material of which your fingernails are made) makes wool flame-resistant because it requires a higher temperature to ignite than other natural fibers. Virtually all artificial fibers, which are made of plastics like nylon and rayon, will flare, burn fiercely.
 - ii. Wool carpets are used as “fire rugs” in front of woodburning stoves. Hot coals spilled on a wool rug will singe the fibers, but not burst into flame.
 - iii. Wool burns so poorly, throwing on a wool blanket is an effective way of smothering a flame.
 - iv. Do not test flammability of wool indoors. “Wool blends” may contain artificial fibers which are highly flammable and give off toxic smoke.
 - d. Maintains its resilience
 - i. Wool has good “elastic recovery,” meaning it springs back to shape well. The baseballs the Red Sox used to win the World Series each contained 150 yards of wool yarn.
 - ii. Wool can be bent 20,000 times without breaking. Silk breaks after 1800 bends, rayon after 75.
 - iii. Wool is highly crimped, so it is used in stereo speakers and heavy machinery to absorb sound. High-priced cars use wool carpet to reduce noise. Lower-priced cars use less-effective artificial fibers.

- e. Twists and sticks together well
- 2. Wool is covered with tiny scales like shingles on a roof, all pointing in one direction. It is also crimped, so the scales easily catch on each other, while the curls and kinks tangle together, making wool the easiest fiber to spin into yarn.

Gather together samples of cloth of various kinds of fiber (not terrycloth towels). Measure the cloth into 6" squares. Fill measuring cups with equal amounts of water. Place the cloths into the cups, leaving them long enough to absorb as much water as they can. Remove the cloths. How much water did each cloth absorb? Which kinds of cloth absorbed best?

Students with access to accurate scales can weigh the cloth samples before and after soaking in water.

Many wool facts from National Geographic, Vol. 173 No. 5, May 1988, in the featured article, Wool: Fabric of History