WASHING WONDERS

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S1 SUPPLEMENT



THE SCIENCE BEHIND A GOOD WASH

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TASHAHUD AHAMED RAFIM

"I put my favourite woollen sweater in the washing machine, expecting it to be cleaned. I did not expect it to shrink. Now, it barely fits anymore," says Lipi Akter, a homemaker from Mugda, Dhaka.

A washing machine is supposed to clean clothes. However, the process may have some unwanted side effects too. A cleaned shirt may become faded, or a sweater may no longer fit. How can something designed to remove dirt also damage the clothes? To understand why these things happen, we must first follow a load through the machine.

HOW CLOTHES ARE CLEANED

Professor Muhammad Abdur Rahman Bhuiyan of the Department of Textile Engineering at Dhaka University of Engineering & Technology says effective washing depends on two things working together: detergent and movement. Neither can be used excessively without negative effects on the fabric.

Imagine putting a sweaty cotton T-shirt, dusty pair of jeans and a polyester sports jersey into a machine. Once a cleaning routine starts, water enters through an inlet and detergent mixes with it. The clothes begin moving through the water. In a front-loader machine, the rotating drum lifts them and lets them fall. Some top-loaders instead move them with an agitator or impeller.

According to Bhuiyan, the washing process starts with loading the clothes and adding detergent, followed by water entering through an inlet valve. The machine then moves the clothes at a controlled speed to loosen dirt. Once the wash is complete, the dirty water is drained, the clothes are rinsed, and a final high-speed spin removes excess moisture.

Each stage has a different purpose. While washing loosens dirt, rinsing carries it away. The final spin mainly removes excess water at the end of cleaning cycle.

DETERGENTS ARE ESSENTIAL

Water alone can can carry away some sweat and loose dust. But body oils and greasy stains cling to the fabric and no amount of mechanical force or water can remove them adequately. Detergent contains cleaning ingredients called surfactants, which help water spread through clothing and loosen those oily marks.

Bhuiyan explains that surfactants have two parts, one attracted to water and the other to oil and grease. When detergent comes into contact with dirty fabric, the oil-attracting part attaches to greasy particles, while the water-attracting part helps lift them away from the fibres and disperse them in the wash water.

> **A good wash is not just about removing dirt. It is about getting clothes clean without damaging their fibres, fading their colours or changing their shape.**

Once loosened, oily dirt can remain dispersed in the wash water instead of immediately settling back on the cloth. Moving water also carries away particles of dust. That is why draining and rinsing matter as much as the first wash: dirt has to leave the machine, not merely leave the shirt.

THE FORCE CONUNDRUM

The movement that makes washing effective also has a downside. As clothes move inside the drum, they rub against one another and the machine's surface. While this friction helps dislodge dirt, Bhuiyan points out that excessive rubbing can loosen fibres,

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