

The Burn Test to Identify Textile Fibers

The burn test is a simple, somewhat subjective test based on the knowledge of how particular fibers burn. Be prepared to note the following when testing your fibers:

- Do the fibers melt and/or burn?
- Do the fibers shrink from the flame?
- What type of odor do the fumes have?
- What is the characteristic(s) of any smoke?
- What does the residue of the burned fibers look like?

Test Procedures

The burn test is normally made on a small sample of yarns or thread which are twisted together. Since the fiber content of yarns used in one direction of a fabric are not always made up of the same fibers used in the other direction, warp and filling yarns should be burned separately to determine the entire fiber content of the fabric.

This test is very helpful in determining whether a fabric is made from synthetic or natural fibers, but it is not foolproof and the characteristics observed during the burning test can be affected by several things. If the fabric /yarn contains blends of fibers, identification of individual fibers can be difficult. Two or three different kinds of fibers burned together in one yarn may also be difficult to distinguish. The odor and burning characteristics exhibited may be that of several fibers, thus making your results difficult to analyze. Finishes used on the fabric can also change the observed characteristics.

- Pull a small sample of at least six to eight yarns from your fabric about 4 inches long, and twist them together into a bundle about 1/8 inch in diameter. You can also use a small snippet of the fabric if you only need to determine whether it is a synthetic or natural fiber fabric and you are not seeking to determine the specific fiber(s) that make up the fabric.
- Hold one end of the bundle with tweezers over a sink or a sheet of aluminum foil (about 10 to 12 inches square) to protect your working area. If the sample ignites it can be dropped into the sink or on the foil without damage. Use either a candle or a match (automatic lighters work well) as your flame.

PLEASE USE EXTREME CAUTION WHEN TESTING!

Some fibers are slow in igniting, but then burn quickly. Others can burn hot and produce a painful burn if caution is not maintained.

Be extremely careful to keep your hair out of the flame.

Be very certain that you are not wearing flammable materials when testing.

Do not stand anywhere near any flammable materials.

Potential Test Results

Natural, Organic & Manmade Fibers

In general, if the ash is soft and the odor is of burning hair or paper, the fabric is a natural fiber. Cellulosic fibers (cotton, linen and rayon) burn rapidly with a yellow flame. When the flame is removed, there is an afterglow, then soft gray ash.

- **Cotton:** Ignites on contact with flames; burns quickly and leaves a yellowish to orange afterglow when put out. Does not melt. It has the odor of burning paper, leaves, or wood. The residue is a fine, feathery, gray ash.
- **Hemp:** Same as cotton
- **Linen:** Same as cotton
- **Ramie :** Same as cotton
- **Rayon :** Same as cotton, but burns slowly without flame with slight melting; leaves soft black ash.
- **Silk:** Burns slowly, but does not melt. It shrinks from the flame. It has the odor of charred meat (some say like burned hair). The residue is a black, hollow irregular bead that can be easily to a gritty, grayish-black ash powder. It is self-extinguishing, i.e., it burns itself out.
- **Tencel :** Same as Rayon
- **Wool, and other Protein Fibers:** Burns with an orange sputtery color, but does not melt. It shrinks from the flame. It has a strong odor of burning hair or feathers. The residue is a black, hollow irregular bead that can be easily crushed into a gritty black powder. It is self-extinguishing, i.e., it burns itself out.

Synthetic Fibers

Most synthetic fibers both burn and melt, and also tend to shrink away from the flame. Synthetics burn with an acrid, chemical or vinegar-like odor and leave a plastic bead.

Other identifying characteristics include:

- **Acetate:** Flames and burns quickly; has an odor similar to burning paper and hot vinegar. Its residue is a hard, dark, solid bead. If you suspect a fabric is acetate, double-check by placing a scrap of it in a small amount of fingernail polish remover-if you're correct, the fabric will dissolve
- **Acrylic:** Flames and burns rapidly with hot, sputtering flame and a black smoke. Has an acrid, fishy odor. The residue is a hard irregularly-shaped black bead.
- **Nylon:** It will shrink from the flame and burn slowly. Has an odor likened to celery. Its residue is initially a hard, cream-colored bead that becomes darker gray.
- **Olefin/Polyolefin:** Has a chemical type odor. The residue is a hard, tan-colored bead. The flames creates black smoke.
- **Polyester:** It will shrink from the flame and burn slowly giving off black smoke. Has a somewhat sweet chemical odor. The residue is initially a hard cream-colored bead that becomes darker tan.
- **Spandex:** It burns and melts, but does not shrink from the flame. It has a chemical type odor. Its residue is a soft, sticky black ash.



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