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Microfiber cleaning cloths

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by [Chris Woodford](#). Last updated: December 20, 2021.

When people joke about "inventing a new mousetrap" or "reinventing the wheel", what they really mean is that most inventions do their jobs pretty well. There's either little need to think of anything new or little chance of coming up with anything better than we have already. If all inventors believed that, we'd still be living in caves and cooking buffalo stew on camp fires. Even the simplest things can often be done better. Take cleaning, for example—a chore most of us love to hate. Who'd have thought there'd be a better way to scrub things clean than using good old soap and water? If you've tried the latest **microfiber cleaning cloths**, you'll know that technology really can make life easier. Not only are these cloths more hygienic, they avoid the need for expensive (and often harmful) detergents and they get things looking far cleaner in a lot less time. It's not magic—it's science. Let's find out how these things work!

Photo: Microfiber ("microfibre" if you're British) is a selling point, so you'll see it prominently written on the packaging of any cloths made this way. However, as I explain in more detail below, there are huge variations in the size of the fibers used in cloths that claim to be "microfiber"—and that makes a big difference to how hygienically they clean. These cloths claim to have fibers 100 times smaller than a human hair, which isn't particularly informative, because human hairs vary enormously in size. Fibers that big would probably put these cloths into the "average" category.

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Cleaning with soap and water

Water is pretty good at cleaning most things all by itself. That's because its **molecules** have two very different ends. They're electrically unbalanced, so they stick to all kinds of things (including lumps of dirt) like tiny **magnets** and break them apart. Water is sometimes called a **universal solvent** because it can dissolve so many different things. Where water alone can't help, you can turn to a **detergent** (a soapy chemical that clings to dirt and grease, breaks it apart, and makes it easier for water molecules to flush it away).

Photo: Some typical microfiber cleaning cloths. These are made by EnviroProducts Ltd and sold under the brand name e-cloth®; Norwex is another very well known brand—and there are many others. e-cloth and Norwex boast the smallest microfibers, making them the most hygienic cloths (assuming, of course, that you keep them clean).

Many people don't like using detergents, however. They're expensive, for one thing. Another problem is that they can

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cause allergic reactions and skin complaints. Some people worry that overusing detergents and cleaning



agents—in an effort to make our homes cleaner and more hygienic—is undermining the way our bodies' immune systems naturally defend themselves against germs. Another complaint is that detergents don't simply disappear into thin air. They contain chemicals that flush down our drains into [rivers](#) and seas, where they gradually build up and cause [water pollution](#). We might be making our homes cleaner, but we're making the environment dirtier in the process. For all these reasons (and a few more), many people would love to be able to clean their homes without chemicals—and that's where microfibre cleaning cloths can help.

What's different about a microfibre cloth?



Photo: The microfibers in this cloth are too small to see. It looks just like a normal towel, but it works in a totally different way.

Suppose you want to clean a large, dirty wall as quickly and thoroughly as you can. You could use a [toothbrush](#), but it would take you forever. So probably you'd opt to use the biggest brush with the most bristles you can find. Now scale the problem down. If you want to clean a worktop really well, what's the best thing to use? You can't use a gigantic brush or even a huge cloth, but you can achieve the same effect

by using a cloth that packs more punch into the same cleaning area. An ordinary cleaning cloth has fibers made of cotton or a synthetic material such as [nylon](#). You've seen pieces of cotton so you know exactly how big the fibers are. But a microfibre cloth has far more fibers and they're much smaller. If "many hands make light work", so do many fingers—or many micro-fibers.

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Why do smaller fibers clean better?

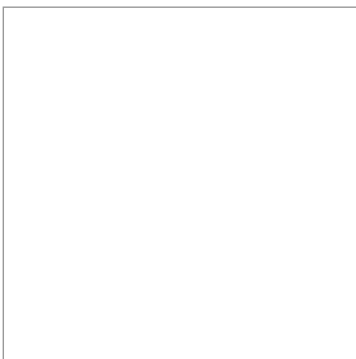


Photo: Closeup of a microfibre cloth. You still can't see the fibers, even at this magnification!

Microfibers are able to attach themselves to even the smallest, most microscopic dirt particles—ones that normal cloth fibers (positively

giant in comparison) crudely brush past. If forces were visible, you'd be able to see that there are [adhesive](#) forces (the forces of attraction) between microfibers and dirt. As you may have learned in school chemistry, these forces are called **van der Waals forces** after their discoverer, Nobel-prize winning Dutch chemist [Johannes Diderik van der Waals](#) (1837–1923). (Van der Waals forces explain why geckos can stick themselves to ceilings using zillions of tiny hairs on their toes.) Although there is only a microscopic amount of van der Waals force between one microfibre and any given dirt particle, remember that there are millions of microfibers in a cloth, so the overall sticking effect is magnified

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dramatically. That's why dirt, dust, and other stuff can be "hoovered up" by microfiber cloths. And it's also why you have to clean microfiber cloths so very thoroughly after you've used them. (Generally, it's best to boil a microfiber cloth in a saucepan and avoid washing it with normal detergents. Follow the manufacturer's instructions if you're unsure what to do.)

Do microfiber cloths "wear out"?

Providing you keep them clean, good quality microfiber cloths will keep on cleaning hygienically. One [recent study](#) of using cloths like this to reduce rates of hospital infection found that "re-usable cloth performance improved at 75 washes, and reduced after 150 washes, although, in most instances, performance after 150 washes was better than at first wash."

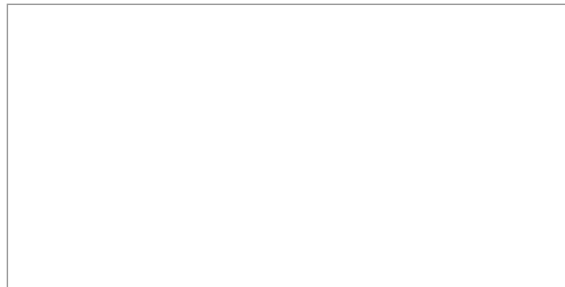
How microfiber cleaning cloths work

Chemical cleaning



If you clean the traditional way, with soap and water, the molecules of the [detergent](#) you use (shown here with orange dots) stick to and break down the dirt and grime (brown blob). When you rinse with a wet cloth (red), the water molecules (blue dots) glued to its fibers stick to the detergent and wash it away with the dirt still attached. This is old-fashioned cleaning with **chemistry**. Compared to a microfiber cloth, a normal cloth has relatively few fibers so it cleans in a hit-and-miss way. Dirt gets missed and detergent and water often get left behind on the surface you're cleaning.

Mechanical cleaning



If you use a microfiber cloth, there's no detergent involved whatsoever, so how is the dirt removed? Instead of detergent, we rely on millions more fibers (shown here as blue lines) that can sweep dirt away. The fibers are made of [plastic](#) and many of them attach themselves to each dirt speck with van der Waals forces. Working as a team, many fibers apply powerful enough forces to dislodge the dirt (loosened with a small amount of water) and carry it away, leaving the surface naturally dirt-free. This is new-fangled cleaning with **physics** using nothing but the adhesive power of forces—cleaning mechanically and without chemicals. The dirt stays locked inside the cloth's fibers until you wash it in hot water, which makes the fibers uncurl slightly and release their dirty content.

How are microfiber cloths made?

Look on the packet that your cloth comes in and you'll probably find it says the ingredients are 50 percent polyester and 50 percent polyamide (another name for [nylon](#)). In other words, you have a mixture of two [plastics](#). The cloth is made by forcing the plastics through a tiny pipe and heating them so they weave together. These fused fibers are then split apart into microfibers 10–20 times smaller.

Chart: Average microfiber cloths can plausibly claim to be antibacterial; the best cloths can claim to remove some of the bigger viruses (though not the smallest ones). Please note that each of the items shown here has a range of different sizes (for example, human hairs range from roughly 50–200 microns), and I've picked a single representative value in each case.

Cloths describes as "microfiber" can vary widely in the size of the fibers they use and therefore in their cleaning effectiveness. In average cloths, the fibers are 10–50 times thinner than a human hair—so each one is only about 3–5 micrometers (three to five microns) in diameter and about 50 times lighter than the fiber in a pair of stockings (0.3 denier compared to typical 15-denier nylon). That's smaller than pollen grains (5–10 microns) or red blood cells (10–30 microns), roughly the same size as "typical" bacteria (1–5 microns is a good rule of thumb), but still bigger than most viruses (which tend to be smaller than 0.5 microns).

Since microfibers can't effectively remove anything smaller than they are, it would be accurate to describe average microfiber cloths as "antibacterial" or "antimicrobial," but "antiviral" would be a more dubious claim. The best cloths can make this claim, however: Norwex and e-cloth, for example, boast that the fibers on their cloths are 1/200 the width of a human hair (around 0.33 microns), which would make them effective for removing over 99 percent of bacteria and at least some viruses, although not 100 percent of them. (One important side-note: microfiber cloths are still very definitely an example of *micro*technology, not [nano](#)technology, because micron-sized fibers are 1000 nanometers wide.) A number of recent studies have found benefits of using microfiber cloths (often combined with steam cleaning) to help minimize the spread of infections in hospitals and similar environments (see the section "Scholarly studies" in the references below).

What's the best way to use microfiber cloths?

Like a traditional cleaning cloth, you use them dry for dusting and very slightly wet for more general cleaning, but you'll need to experiment! The first time you use one, force of habit will probably make you soak it with water and add loads of soap as well—both of which will reduce the cloth's effectiveness. I find the best way to use these cloths is with as little water as possible. If you're cleaning very dirty windows, for example, use a standard cloth and soapy water to wash all the dirt off first. Then rinse them thoroughly with clean water and use a rubber squeegee to get them almost dry, and let them dry in the air for just a little longer. At this point, with hardly any water remaining on the [glass](#), polish over with your microfiber cloth—and you'll be amazed at the smear-free, sparkling finish. If your windows aren't too dirty to start with, simply use the microfiber cloth by itself with a little water. You can use microfiber cloths to clean virtually any hard surface. Try them on your bathroom or kitchen

surfaces and you'll be amazed at the results. (Sorry to sound like a bad TV advertisement, but these things really are good!) You'll literally hear things getting *squeaky* clean and shiny.

What about microfiber pollution?

Photo: Single-use, disposable plastics (such as these bottles) are increasingly frowned upon. Do we also need to pay more attention to invisible microplastics shed by synthetic cloths? Photo by John Gordinier courtesy of [US Air Force](#).

Microfiber cloths are *plastic* cloths, which might make you wonder if they cause environmental problems as well as solve them. Public concern about the use of disposable plastics has been growing for years, but the [release of plastic microfibers into the environment](#) is a relatively new concern. Every time you wash synthetic clothes, some microfibers break free and they're eventually released into rivers and oceans making a new and pervasive form of water pollution. One [2019 study](#) estimated that 2 million tonnes of microfibers enter the ocean each year. Incredibly, microfiber plastic has even been [found in rain and snow](#).

Do microfiber cloths pose a particular threat? Given that ordinary synthetic clothes release large volumes of microfibers, and that microfiber cleaning cloths probably represent only a tiny fraction of all the things you launder, it's unlikely that they're adding significantly to what is already a huge problem. [One recent study](#) found 75,000 microfibers released per square meter of fabric per wash, but also reported that using detergents and high washing temperatures encourages microplastic releases—and you shouldn't really be washing your microfiber cloths in that way. If you're especially concerned about this issue, look into using special fiber-trapping balls and washing-machine filters. [One study](#) found they "significantly reduced the numbers of microfibers... in washing effluent." [Another one](#) noted that technologies like this are (not surprisingly) less effective at trapping shorter fibers than longer ones, suggesting the tiny fibers in microfiber cloths (which are up to 1000 times smaller than the microfibers released by normal synthetic clothes) might pose a unique issue that even fine filters may struggle to address.^[1]

All told, microfiber cloths have very clear environmental benefits, but it's still important not to brush aside potential concerns like these. I've not yet discovered any scientific studies specifically devoted to measuring plastic releases from microfiber cloths; when I do, I'll post details here.

If microfiber cloths are so good, why aren't they more popular?

Photo: Household detergents: who really needs them?

Microfiber cloths are much more widely known and used in Europe than in the United States, partly because that's where the market leading brands originated (E-Cloth in the UK; Norwex in Norway). The household chemicals market is worth [tens of billions of dollars](#) to big chemical companies and the stores that sell them; they have little or no incentive to get behind a simple technology that undermines their costly products. Companies like this have spent a fortune on advertising for several decades, happily convincing most of us that we need to blast our homes with industrial-strength cleaners in a never-ending war on germs. Is it any wonder, then, that we're skeptical of "magic" microfiber cloths that promise to get our homes hygienically clean with nothing but water?

If you're still doubtful, try one of these cloths for yourself. And remember that what's cleaning your home isn't magic—it's science!

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On this website

- [Adhesives \(glues\)](#) (more about van der Waals forces and how geckos climb walls)
- [Detergents and soaps](#)
- [Roomba robot vacuum cleaners](#)
- [Vacuum cleaners](#)
- [Water](#)

Books

- [The Little Green Book: 365 Ways to Love the Planet](#) by Joseph Provey and Owen Lockwood. Creative Homeowner, 2008. If you like the idea of helping the environment by ditching detergents, this book may appeal: it has hundreds more simple "planet-saving" tips for you to try. (Microfiber cloths are covered in here as tip#177.)
- [Green Cleaning For Dummies](#) by Elizabeth B. Goldsmith and Betsy Sheldon. Dummies, 2008. More ideas for green cleans, with an emphasis on avoiding harsh chemicals or using friendlier alternatives.

Articles

Popular

- [Five Affordable, Effective Alternatives to Disposable Cleaning Products](#) by Jolie Kerr. The New York Times, November 21, 2018. Reusable cleaning products (not just microfiber cloths) make both economic and environmental sense.
- [In the war against dust, a new tool inspired by geckos](#) by William Weir. Yale News, April 26, 2016. Explores new micro-cleaning tools inspired by the adhesive brushes on a gecko's feet.
- [Taking back control](#) by Elizabeth Gillespie. Australian Hospital Alliance Bulletin, June 27, 2013. A summary of the benefits of using microfiber cloths with steam cleaning in hospitals and healthcare.

Scholarly studies

- [Comparison of steam technology and a two-step cleaning and disinfecting method using microfiber cloth...](#) by Nefise Oztoprak et al, GMS Hyg Infect Control, 2019 Oct 24. This compares steam cleaning alone with cloth cleaning and disinfectant.
- [Improving operating room cleaning results with microfiber and steam technology](#) by Elizabeth Gillespie et al. Am J Infect Control. 2016 Jan 1;44(1):120–2. Explores the effects of using microfiber and steam together.
- [Microfiber cloths reduce the transfer of Clostridium difficile spores to environmental surfaces compared with cotton cloths](#) by Adriana Trajtman et al. Am J Infect Control. 2015 Jul 1;43(7):686–9. Microfiber cloths can reduce the risk of C difficile spore transfer.
- [Removal and Transfer of Viruses on Food Contact Surfaces by Cleaning Cloths](#) by Kristen E. Gibson, Philip G. Crandall and Steven C. Ricke. Applied and Environmental Microbiology, May 2012, Vol. 78 No. 9, pp.3037–3044. A detailed scientific study comparing the effectiveness of microfiber and other cloths at removing bacteria and viruses from various different surfaces.
- [Assessing the efficacy of different microfibre cloths at removing surface micro-organisms associated with healthcare-associated infections](#) by DL Smith et al. Journal of Hospital Infection. July 2011, Volume 78, Issue 3, pp.182–186. A comparison of how well 10 different microfiber cloths can tackle hospital infections.
- [The antibacterial action of cloths and sanitizers and the use of environmental alternatives in food industries](#) by F. Lalla et al, Journal of Environmental Health, December 2005, Volume 68 Number 5, pp.31–35. Fiber cloths appear to spread less bacteria than generic cloths.
- [The efficacy of cleaning products on food industry surfaces.](#) by F. Lalla et al, Journal of Environmental Health, September 2004, Volume 67 Number 2, pp.17–22. Fiber cloths remove more bacteria from cleaning surfaces than generic cloths sanitized with hot water.
- [Micro-fibre and ultra-micro-fibre cloths, their physical characteristics, cleaning effect, abrasion on surfaces, friction, and wear resistance](#) by Steinar K. Nilsen et al. Building and Environment, Volume 37, Issue 12, December 2002, pp.1373–1378. A comparison of different types of microfiber cleaning cloths, their cleaning effectiveness, and the surface damage they do.

Patents

- [US Patent 6,258,455: Antimicrobial ultra-microfiber cloth](#) by George G. Clarke, Sweports Limited, July 10, 2001. For those of you who like more technical detail, this is a fascinating patent that describes the antimicrobial action of microfiber cloths with fibers of about 0.3 deniers.

Notes and references

1. ↑ [Microfiber Masses Recovered from Conventional Machine Washing of New or Aged Garments](#) by Niko L. Hartline, et al, Environ. Sci. Technol. 2016, 50, 21, 11532–11538, quotes the synthetic fibers released from conventional washes as 20–333 µm (very roughly, human hair dimensions). The best microfiber cloths are using fibers more like 0.33µm, which are 60–1000 times smaller.

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