

# How permanent are permanent markers

[Environment](#), [Water](#)



For my science fair project, I figured out what solvent would work best to erase permanent marker. The solvents I tested were: lemon juice, vinegar, water, and rubbing alcohol. I tried each of these solvents on a permanent marker line on plastic, paper, fabric, and wood. In this research paper, I will be talking about what a permanent marker is, how they are made, why they work so well, what rubbing alcohol is and its common uses, what vinegar is and its common uses, what water is and why water is so essential, and what exactly lemon juice is.

I will also be talking about how plastic is made, how fabric is made, how wood is made, and how paper is made. A permanent marker is a type of writing utensil that is used to create permanent lines on almost any surface. The ink of a permanent marker is water resistant, contains propanol, butanol, diacetone alcohol, and different dye colorings, and can vary between all colors from black to yellow. The process of creating a Sharpie permanent marker is not very long or complicated. First, the barrel of the marker is molded out of a plastic resin.

Screen printing is added to the barrel, including information such as the description of the color of the ink and the Sharpie logo. A filament made out of cotton material is used to hold in the ink as it is inserted into the barrel. A needle is used to inject the permanent ink from the opposite end of the barrel. Then the writing tip is applied. The cap is placed on the Sharpie marker and the permanent ink is slowly absorbed into the tip of the marker. The Sharpie is the most popular permanent marker company worldwide.

The brand “Sharpie” was founded in 1857 and sold ink and glue. Any permanent marker’s ink must contain three ingredients to work. These

<https://assignbuster.com/how-permanent-are-permanent-markers/>

ingredients are colorant, carrier, and resin. The colorant is what gives the ink its color. Colorants in permanent markers are often pigments, instead of dyes, because pigments fade less easily and do not bleed through paper. Dyes are soluble in water, whereas pigments are not. Dyes cannot withstand light as long as pigments can, although dyes are generally available in a wider spectrum of colors.

Carriers are what transmit the dye to the paper. They must be able to evaporate quickly once the ink is used. Carriers used to be made up of chemicals such as xylene and toluene, but were vastly replaced by alcohol-based markers in the 1990s. The resin is what causes the ink to stick to a surface. It must have a “ sticky” quality. The resin forms a film over the pigment once the carrier evaporates. The reason that permanent marker works is because permanent ink soaks into a surface, whereas regular erasable ink does not soak into surfaces, but binds to surfaces.

Permanent ink is made with resins and dyes dissolved in glycol and water. The ink dries when the glycol or water evaporates and it soaks into the surface, leaving a permanent mark. There are ways to effectively remove ink from permanent markers. Alcohol will work to erase permanent marker on almost any surface. Many items, such as hairspray or deodorant, contain alcohol and could effectively erase permanent marker. Baking soda is another well-known permanent marker remover. Vinegar was one of the solvents I experimented with. Vinegar is the product of the fermentation of ethanol.

The very slow fermentation process can take weeks or even months and occurs naturally. With a machine to help promote oxygenation, however,

<https://assignbuster.com/how-permanent-are-permanet-markers/>

fermentation can be as quick as a few days. The typical pH of vinegar can range from 2 to 3.5. Vinegar can be used for many things, such as a cooking ingredient or condiment, it can be used for household cleaning, it has medicinal properties, and it even has agricultural applications. Lemon juice was another solvent I experimented with. Lemon juice is exactly what it sounds like. It is lemon juice squeezed from a lemon.

Lemon juice has similar nutritional values as the whole lemon. Lemon juice is an excellent source of Vitamin C and can help your body against harmful germs and bacteria. Lemons are also antioxidants and can help the brain and nerve cells as well as having calcium to help your bones and teeth. The solvent that worked best in my experiment was rubbing alcohol. Rubbing alcohol is a denatured alcohol especially used as an antiseptic. It can also be used to cool, warm, or soothe skin. It can inflame the skin and if ingested, may potentially be fatal.

Rubbing alcohol consists of 2 ingredients: isopropyl alcohol and water. In fact, rubbing alcohol consists of so much isopropyl alcohol (70%) that it is often referred to just as isopropyl alcohol. Water was the final solvent that I used in my experiment. Water is essential for anything and everything. Human beings need water to stay hydrated and survive. All living creatures need water to stay hydrated and survive. Everyone uses water every day; whether it's to shower, brush their teeth, to drink, swim, wash their hands, or to water plants.

Seventy percent of the world is made up of water. Water contains two hydrogen atoms and one oxygen atom, and is often referred to as H<sub>2</sub>O. The H<sub>2</sub> stands for the 2 hydrogen atoms and the O stands for oxygen. Water can

be a liquid, solid, or gas. Water in its regular state is a liquid, can be frozen to form ice, which is a solid, or boiled at 100° C to evaporate it and turn it into water vapour, which is a gas. Plastic was one of the surfaces I used in my experiment. Plastic comes from the Greek word *plastikos*, which means fit for moulding.

Plastic is made using a long and complicated process. First, petroleum is drilled and transported to a refinery. Then, crude oil and natural gas are refined into many petrochemical products such as fuel for your car, ethylene, and propylene. Catalyst is combined with ethylene in a reactor, resulting in polymer, a powdered material. Afterwards, the polymer is combined with additives in a blender. The polymer is put in an extruder, where it gets melted. The melted plastic is now cooled and a machine cuts the plastic into small pellets. The pellets are shipped to industries.

The industries manufacture plastic products by melting the pellets to a semifluid state, putting it in a mould under great pressure, and hardening it. The mould opens and the product is completed except for detail work. Another surface that I used in my experiment was paper. To make paper, first trees are specially harvested like crops for the purpose of making paper. Logs of wood are put through a machine that takes off all the bark on the tree. Then, wood chippers cut the wood into 1 inch bits and the bits are put inside a pressure cooker with chemicals and water.

The pulp is then washed, refined, cleaned, and turned to slush in a machine that beats the pulp. Color dyes, coatings, and other substances are mixed in and the slush is pumped onto a moving wire screen. The water is drained away on the screen and is recycled. The web of slush is rolled between large

rollers to remove a large amount of the excess water and to ensure smoothness and uniform thickness. The resulting product is run through heated drying rollers to remove all of the remaining water. The completed paper is wound into large rolls, which can measure up to 30 feet wide.

A slicer cuts the paper into small, more manageable rolls. The paper is now ready for use. Wood was the third surface I used in my experiment. The process for making wood is quite simplistic. First, logging companies cut trees down and bring them to a mill. There, they are prepared for particular uses. Machines cut the logs into boards and are sealed or pressure-treated to preserve them. Then the boards are either sold through a lumberyard or sold directly to companies which need them. Fabric was the final surface that I tested the removal of permanent marker on. Cotton fabric also has a lengthy process.

First, the ginning, which is the method of separating cotton fibres from seedpods. This is done by machines in a cotton field. Then, the cotton fibre is spun. Yarn is produced from spinning cotton fibre. In this stage, the cotton yarns are made of different thicknesses. Afterwards, a machine weaves threads of yarn, which eventually turn them into cloth after weaving many threads together. Now, the cloth is basically constructed, but must go through some detail work. First, the cloth goes through singeing, which is the process that burns off excess fibres sticking from the goods.

Then, the cloth goes through scouring, which is the cleaning of the fabric. Then, some fabrics are bleached to make it a lighter colour. Mercerizing, which is the dipping of fabric in alkali to make it stronger, shiny, durable, shrink free, and stretch free, comes next. Finally, the fabric is treated with

chemicals to make it more durable, and it is shipped off to companies that will either use or sell it. Vinegar, water, lemon juice, and rubbing alcohol all have many uses around the house, but when it comes to erasing permanent marker, rubbing alcohol definitely beat the rest.