

How To Make Ink

Inks were originally made from the natural pigments in living materials such as berries, nuts, and leaves. The pigments in a green leaf, for example, absorb all the color wavelengths of light except for green. Therefore the green color is the only one reflected back to our eyes and the only color we see. (Remember ROY G BIV? A beam of light contains the colors of the rainbow: red, orange, yellow, green, blue, indigo, and violet. Under normal circumstances, though, we don't see all of those colors because some or all of them are absorbed by the material they shine on.) Through chemical processes, these pigments can be extracted and turned into dye or ink. Here are some easy recipes for ink you can make at home.

Berry Ink. Use 1/2 cup fresh berries or thawed frozen berries; push them through a strainer so that you get pulp-free juice. Add 1/2 teaspoon of vinegar (to hold color) and 1/2 teaspoon salt (as a preservative) and mix well. You can use a glass baby food jar as your "inkwell", if you have one.

Walnut Ink. Crush the shells of 12 walnuts by putting them in a sock and hammering them lightly. Pour the shells into a saucepan and cover them with water, then let them simmer for 30 minutes. After that, remove them from heat and let them soak overnight. Strain the shells out of the ink and add 1/4 teaspoon of vinegar to help preserve the color.

Invisible Ink. Try writing with lemon juice on a piece of paper using a paintbrush or Q-Tip. When the ink has dried, hold the paper over a toaster to heat it. Your writing should appear in brown lettering as the parts of the paper with acid from the lemon juice brown faster than the other parts. You can also make invisible ink from equal parts baking soda and water. Brush grape juice over your secret message to reveal the writing--the acidic grape juice reacts with the baking soda, which is a base. (Find out more with our **acids and bases experiments**.)

Black Permanent Ink

- 1/2 tsp lamp black (which you can buy or can make by holding a plate over a candle and collecting the soot or from collecting other char)
- 1 egg yolk
- 1 tsp gum arabic
- 1/2 cup honey

Mix together the egg yolk, gum arabic, and honey. Stir in the lamp black. This will produce a thick paste which you can store in a sealed container. To use the ink, mix this paste with a small amount of water to achieve the desired consistency.

Brown Ink

- 4 teaspoons loose tea or 4-5 teabags
- 1 teaspoon gum arabic
- 1/2 cup boiling water

Pour the boiling water over the tea. Allow the tea to steep for about 15 minutes. Squeeze as much tea (tannin) as possible from the tea or teabags. Stir in the gum arabic. Strain the ink and allow it to cool before bottling it.

Prussian Blue Ink

- Prussian Blue pigment (sometimes sold as laundry bluing)
- water

Mix the pigment into the water to achieve a rich blue ink. Unless you happen to have a calligraphy pen, the easiest way to use these inks is with a homemade quill or a paintbrush.

How To Make Paper

In Egypt, the first paper was made from the water grass *papyrus*. In medieval Europe, calfskin was used to make vellum and the under-lining of sheep skin was used for parchment, on which scribes recorded financial transactions and monks copied scripture. But paper as we know it was invented by the Chinese by 105 AD-- they used hemp pulp to form sheets of it. The papermaking process was refined by the Arabs and arrived in Europe by the 1100s.

Now we have technology that allows us to make shiny book covers and photo paper, fine-grained printer paper, and cheap newsprint. Better paper-making technology allows us to have access to paper in all sizes, shapes, colors, and textures. You can even make your own recycled paper!

Materials:

- Scraps of newspaper, printer paper, stationery, etc.
- Screen or sturdy netting
- Wooden frame (about 8" x 12")
- Blender
- Plastic basin
- Sponge
- Kitchen towel

What to Do:

1. Tack or staple the screen or netting over one side of a wooden frame to use as a "deckle" for straining the paper pulp.
2. Shred or tear enough paper to half-fill a blender. Add warm water to fill the blender and blend until you have a pulp mixture with no chunks of paper. Dump the pulp into a plastic basin and add a pitcherful of warm water, mixing the two together.
3. Set your deckle in the basin, screen-side down, holding it just under the surface so that pulp collects evenly on top of the screen. Pull the deckle out and shake it gently so most of the water drains out. Press a sponge over the top of the paper to soak up excess water.
4. Press a clean kitchen towel or piece of felt against the paper and carefully pull it away from the screen. Let your paper dry, and then peel it off the towel.

Try making paper with more or less water, and using pulp made with just one kind of paper (e.g., newsprint). What happens to the texture?