

WestFest

SCIENCE & SUSTAINABILITY

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Making Earth-Friendly Paint

Materials:

Water	Paint Brush	Orange Peel Powder
Honey	Watercolor Paper	Spinach Powder
Baking Soda	Stirring Stick	Red Cabbage Powder
Lemon Juice	Mixing Dish	

Directions:

1. Choose one powder to start with (orange peel, spinach or red cabbage).
2. Put a pinch of powder in your mixing dish.
3. Place a drop of honey on top of the powder.
4. Add 3-5 drops of water.
5. Use the wooden stir stick to mix the ingredients together.
6. Repeat steps 2-5 until you get a thin paste.
7. Take your brush and test a little bit of your paint. Is it the way that you want it?
8. For thicker paint, add another 1-2 drops of honey or a pinch more powder and mix well. For thinner paint, add 1-2 drops of water and mix well.
9. Repeat steps 1-6 for the other two types of powder.
10. Change the pH of your paint mixture to see if it changes color! To do this, add a small pinch of baking soda or a drop of lemon juice and mix well.
11. Experiment! Try changing the recipe and see what happens. Can you make a really dark color, or a lighter one? What happens if you make a painting and then sprinkle baking soda or lemon juice over it?
12. Let your painting dry on a flat surface for 1-2 days or until it is dry to the touch.
13. Compost any leftover ingredients! If you don't want to keep your painting, you can compost that too.

What is pH, and how does it change?

The abbreviation “pH” stands for the “power of hydrogen.” It measures the concentration of hydrogen ions, which are tiny molecules that attach to other molecules in ways that change their shape. They are too small to see, but we can still observe what they do. Changing a molecule’s shape changes its chemical properties and can affect the color we see. If something is really crowded with hydrogen ions, it is acidic and has a low pH number. If something has fewer hydrogen ions, it is alkaline (or basic) and has a high pH number. Lemon juice is acidic, and baking soda is alkaline. Adding either one to your paint will change the ratio of hydrogen ions, turning the pH lower or higher.

Some common acidic things are lemons, tomatoes, vinegar, and sour candy. Some common alkaline (or basic) things are sea water, almonds, avocado, and soap. Red cabbage is a pH indicator, which means we see a color change when the pH gets higher or lower. Many scientists use pH-sensitive materials to measure the pH of a solution, by comparing the color to a pH color indicator chart. For painters, pH is important in helping to create the colors they need.

What is compostable paint?

Composting is the earth’s way of recycling. It is one of the important ways kids can help take care of the environment. Food scraps, dead plants, cardboard, paper, and even some fabrics can be composted at home. Small invertebrates, fungi, and bacteria turn these materials back into nutritious soil that feeds the growth of new plants and animals. Waste that doesn’t get composted or recycled goes to the landfill, where it can’t turn back into healthy soil.

Did you know that most paints are made with a type of plastic? This kind of paint (and anything painted with it) can’t be composted or recycled. Instead, it has to go in the landfill. However, before these paints were invented, people made paint out of compostable ingredients, including plants, clay, oil, and eggs. Most of the famous old paintings you see in museums are actually compostable! Making compostable paint is fun, affordable, and good for the earth.

When you think about the things in your house, consider what will happen to them when they’re no longer needed. Can they be composted or recycled, or will they end up in the landfill? No material can last forever, so it’s important to think about where your things will go after you use them. That way, we can reduce the amount of trash in the world. Using compostable paint is a great way to help take care of the earth!



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Want to learn more?

Check out the supplemental document *Biodegradable Paint Recipes* (go.osu.edu/WestFestKits2023) for more recipes and instructions for making your own pigments for oil paints, watercolors, and dyes.

Sources

Exp.ii. (2010). *What is pH? Definition & Overview*. Retrieved from <https://www.exp.ii.com/t/what-is-ph-definition-overview-10348>

Natural Earth Paint. (2022). *Recipes*. Retrieved from <https://naturalearthpaint.com/blog/tag/recipes>

USEPA. (2023). *Composting at Home*. Retrieved from <https://www.epa.gov/recycle/composting-home>

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Biodegradable Paint Recipes

From the Living Art & Ecology Lab at OSU

Materials

Fruits, vegetables, peels, seeds, leaves, or roots	Cooking pot and stove (for dyes)	Electric coffee grinder (for dry pigment)
Agar powder or gelatin	Mortar & pestle	Small bowl and spoon
Strainer and/or coffee filter paper	Measuring spoons, if desired	Small jars with lids to store your product

Note: Adult supervision/assistance is strongly recommended for these recipes

Instructions for Dye

1. Wash your plant materials and chop into small pieces.
2. Place chopped plant materials in a pot and add just enough water to cover.
3. Simmer on low heat for at least 15 minutes, then turn off stove and allow the mixture to steep overnight for 12-18 hours.
4. Strain out the plant matter, and you have dye! This can be used in dye baths or thickened with agar powder to create ink.
5. For higher extraction, you can freeze or puree your plants before cooking, and then filter through paper coffee filters when finished. You can also give your dye a second round of cooking on low heat if you want to evaporate out extra water and create a more concentrated dye.

Instructions for Pigment

1. Clean your plant materials and chop into small pieces.
2. Dehydrate them thoroughly, either in the oven on low heat for a few hours, or in the sun for a day or two. If using the oven, check regularly so they don't burn!
3. When fully dehydrated, grind in an electric coffee grinder until you have a very fine powder. If it feels gritty, it is still too coarse. NOTE: it is recommended to wear a dust mask/KN95 mask when working with fine particulates of any kind. Plant dust may be organic, but it still doesn't belong in your lungs!

Store your pigment or dye in a sealed jar when not in use. Dehydrated pigment can last for months to years. Dye may need to be kept in a cool dark place (fridge or cellar) to avoid bacterial growth depending on the chemical composition, but some dyes made from peels or pits will contain natural anti-microbial properties. You can also add a couple drops of clove or thyme oil as a preservative.

How to Mix Paint

There are a variety of binders you can use to mix your pigment or dye depending on the viscosity and texture you are looking for. These are just a few options! For more recipes and ideas, see the links below.

Watercolors

You can mix your pigment or dye directly with filtered water to the desired color. I recommend starting with about 1/8 teaspoon (or less) of color, and half or equal amounts water. If it is too thin, it can be thickened with agar powder or gum arabic to the desired consistency.

Honey Watercolors

Mixing honey into your watercolors will improve pigment suspension and add a nice gloss to your finished painting. You can experiment with ratios. I find one part honey to two or three parts water works well. Honey is naturally antimicrobial and antifungal, which will help your painting last a long time.

Oil Paints

Linseed (flax) oil or walnut oil are good choices. Start with a small amount of pigment and add oil a couple drops at a time until you reach the desired consistency. I use a mortar and pestle for this, you can also use a palette and glass muller. It is recommended to add a drop of clove, thyme, or peppermint oil as a preservative.
NOTE: Water-based dyes will NOT mix with oil!

Egg Tempera

This is a professional medium pre-dating oil paint that holds its color and gloss very well and can last for hundreds of years. To start, carefully separate an egg yolk, leaving the whites. Dry the egg yolk by carefully rolling it across your palms or rolling it on a paper towel. When all the white is removed, hold the yolk over a dish and break the skin, allowing the contents to flow into the dish. Discard the yolk membrane. Now you're ready to mix in your pigment! It dries quickly and does not store well when fresh, so only mix what you will immediately use. You can store egg yolk in a closed container in the fridge for up to several days.



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Sources

 [OSU Living Art & Ecology Lab](#)

Natural Earth Paint. (2022). *Recipes*. Retrieved from <https://naturalearthpaint.com/blog/tag/recipes>

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