

Episode 1



Kitchen Chemistry

Any questions?
Reach out
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Veggie Scraps & Dyes

People have made natural dyes for thousands of years by mixing brightly colored things found in nature, such as plants, insects, or sea creatures, with water and fats. Brightly coloured organisms produce different compounds that give their hue, which can be extracted to use as dyes. There are four main compounds that provide the bulk of the colour seen in natural products, but often these compounds are found in different concentrations with other coloured compounds to produce different hues.

1. **Carotenoids** are pigments that can be yellow, orange, or red. They give colour to pumpkins, carrots, corn, tomatoes, and even crustaceans and flamingos!



2. **Anthocyanins** are pigments that can be red, purple, blue, or black. They give colour to blackberries, raspberries, blueberries, cherries, eggplant, red cabbage, & grapes.



3. **Chlorophyllin** pigments are derivatives of chlorophyll, and they are green just like chlorophyll.



4. **Betain** is a red pigment obtained from beets.



Veggie Scraps & Dyes

Materials

- Veggie scraps/veggies going off that you don't want to waste
 - For red: beet skins, avocado skins and pits, berries that are past their prime
 - For orange: yellow onion skins, orange peels
 - For yellow: lemon peels, turmeric
 - For green: wilted spinach, wilted herbs
 - For blue/purple: red cabbage, blackberries that are past their prime
 - For brown: used tea leaves, used coffee grounds
- Vinegar
- Salt
- Cloth for dyeing (fabric napkins, cotton t-shirt, cotton pillow case) -- natural fabrics that are light in colour work best
- A pot large enough to fit your cloth fully submerged in water
- Pot(s) to stew your veggie scraps
- Strainer
- Drop cloth or tarp (something to protect your surfaces from stains)
- Gloves
- Elastic bands (for tie-dye)
- A large spoon for stirring
- Large ziploc bag

Safety Considerations

- Only adults should be chopping the veggie scraps/using sharp knives
- Take care when boiling the dyes and the cloth



Veggie Scrap Tie Dying



Make the dye(s) -- can be done ahead

Steps

1. Assemble your veggie/fruit scraps (if they are in large pieces, tear or cut them) and add them to a saucepan
2. Fill your pot with twice as much water as you have scraps. You want your scraps fully covered and able to swirl around when stirred.
3. Put your scrap pot on the stove, and bring the mixture to a simmer. You want some bubbles but not a rolling boil.
4. Cook the mixture for one hour -- to protect your surfaces from stains (the mixture sprays a little bit while simmering), it is recommended to cover your pot with a lid, but leaving the lid slightly ajar to allow for steam to escape -- stir periodically to keep your scraps from settling to the bottom
5. After the hour has passed, your mixture should be a dark colour (the darker it is, the stronger the colour will be) -- let your mixture cool fully before straining out the scraps
6. Your dye is now ready to use! You can either use it right away, or store it in the fridge

Prep your cloth

Steps

1. To help the dye bind to your cloth, you need to use a **mordant** (i.e. a dye fixative)
2. Add your cloth to a pot large enough to soak it in your mordant mixture
 - a. If you are using **fruit based** dye, soak your cloth in a mixture that contains $\frac{1}{4}$ cup salt for every 4 cups of water
 - b. If you are using **veggie based** dye, soak your cloth in a mixture that contains 1 cup vinegar for every 4 cups of water
3. Add enough of your mordant mixture to the pot to fully submerge the cloth
4. Simmer your your cloth/mordant mixture for 1 hour to allow the mordant to bind to the fabric
5. Allow the mixture to cool completely before removing the cloth
6. When you are ready to start dying your cloth, remove it from the cooled mordant liquid, ring it out, but **do not fully dry it** -- you want the cloth to still be damp when you add it to the dye

Dyeing Time

Steps

1. Prep your space -- cover your work space with some newspaper or a tablecloth that you won't mind getting stained (some of these dyes will stain surfaces, depending on what you use) -- I also recommend gloves and an apron to protect yourself for stains
 - a. If the weather is nice enough, this is a great activity to bring outside
2. There are two different ways that you can dye your cloth from this step
 - a. If you want it a solid colour, soak the cloth in the dye until it reaches your desired colour
 - b. If you want to tie-dye your cloth, bundle your cloth with several elastic bands, then pour your dye on different parts of the cloth -- make a pattern, use several colours, or just go bananas (it's your choice!)
3. Once you have added the dye to your cloth, place your cloth in a large ziploc bag, seal it, and let it sit for 24 hours
4. Once the 24 hours is up, you can remove the cloth from the bag (and any elastic bands if you tie-dyed) -- you can either let your cloth air dry or you can add it to an empty dryer and run it on high for an hour (this helps to heat set the dye)
5. You are done! Now you have a custom Science Venture shirt, a fun pillow case, or some sweet napkins -- to preserve your beautiful dye job, hand wash gently in cold water