

RECIPE #/ COLOR	INGREDIENTS/ PRODUCTS USED + MEASUREMENTS	TIME TO PRODUCE MIXTURE	TEXTURE RIGHT AFTER PRODUCTION	TEXTURE + SIZE ONCE HARDENED/DRIED
<i>1 – green</i>	100 mL cold tap water 15 mL vinegar 22 g cornstarch 22 g glycerol	18 minutes	glossy liquid, little thickness (similar to that of glycerol)	jelly-like, very similar to that of gummy. shrunk in size
<i>2 – red</i>	160 mL hot tap water 24 g agar 6 g glycerol	8 minutes	grainy, chunky, would not separate while simmering	shrunk in size (roughly half of the original size). firm but still bendy to an extent
<i>3 – yellow</i>	90 mL tap water 40 g cornstarch 8 mL canola oil	1 minute, 30 seconds	grainy but solid mixture, could physically mold by hand	relatively firm and shrunk in size. thin squares specifically – frail, curled upwards. dense cubes specifically – sturdy.
<i>4 – blue</i>	100 mL tap water 10 mL vinegar 10 g glycerol 12 g wheat flour	17 minutes	very liquidy, not much solid fixture to it. almost gel like	shrunk in size immensely; sank into the mold. sticky and left residue
<i>5 – peach/ orange</i>	100 mL tap water 10 mL vinegar 10 g glycerol 15 g potato starch	10 minutes	gel like, hard to flatten, slimy	fragile but sturdy too, holds its weight
<i>6 – purple</i>	100 mL tap water 10 mL vinegar 10g glycerol 12g tapioca starch	8 minutes	when left untouched on heat, it would solidify. started liquidy, ended slimy and rubbery	didn't sink into cube molds (too sticky when made). dense cubes specifically – still squishy and jelly like. thin squares specifically – “crispy” edges but soft throughout
<i>7 – colored by juice</i>	100 mL beetroot juice 10 mL vinegar 10 g glycerol 14 g potato starch	5 minutes	jelly mixture, super odorous (usually wouldn't comment up but it was intense)	shrunk in size (roughly half of the original size), mostly firm but bent a little. specifically dense cubes – little bit squishier
<i>8 – clear</i>	120 mL cold tap water 24 g gelatin 6 g glycerol	6 minutes	pure liquid, foamy/bubbly	didn't stay as clear (yellow tinted). specifically thin squares – firm and hard yet able to bend without cracking/breaking. specifically dense cubes – super super hard, shrank (roughly half of the original size)

RECIPE #/ COLOR	PROS	CONS
1 – green	<ul style="list-style-type: none"> <li>- flexibility could be good for certain plastic items like bags of some sort (but as mentioned in cons, tearing isn't ideal)</li> <li>- could be a fitting alternative for silicone or plastic products with similar textures to silicone</li> <li>- was near full biodegradation revolution in all samples and once tampered with, disintegrated in the river water sample</li> </ul>	<ul style="list-style-type: none"> <li>- almost too squishy once dried, could tear easy (applies to thin squares)</li> <li>- not very true to size (shrank a lot)</li> </ul>
2 – red	<ul style="list-style-type: none"> <li>- balances a firm structure but also has its own limits of flexibility</li> </ul>	<ul style="list-style-type: none"> <li>- when it eventually biodegrades/fades out post-tampering, it becomes a somewhat wax-like texture (hopefully this is a step before a true “disintegration”), which the texture could pose problems</li> </ul>
3 – yellow	<ul style="list-style-type: none"> <li>- hard texture, especially the small dense cubes</li> </ul>	<ul style="list-style-type: none"> <li>- flatter/thinner pieces could crumble under light pressure</li> <li>- gritty, not a smooth solid</li> </ul>
4 – blue	<ul style="list-style-type: none"> <li>- biodegrades, in small amounts at least, quickly in all water samples. did take a bit longer in saltwater</li> </ul>	<ul style="list-style-type: none"> <li>- still sticky and leaves marks of like slimy texture on your hands</li> <li>- took a long time to dry and be remotely firm enough to remove from molds</li> </ul>
5 – peach/ orange	<ul style="list-style-type: none"> <li>- balances a firm structure but also has its own limits of flexibility</li> <li>- even though some parts are like crispy (really thin and really hard), it did not break under hand pressure</li> </ul>	<ul style="list-style-type: none"> <li>- did not even mostly biodegrade/fade out after tampering, would only split a little</li> </ul>
6 – purple	<ul style="list-style-type: none"> <li>- good for thinner plastic items like plastic bags, bottles, and wrappers</li> </ul>	<ul style="list-style-type: none"> <li>- when it eventually biodegrades/fades out post-tampering, it becomes a somewhat wax-like texture (hopefully this is a step before a true “disintegration”), which the texture could pose problems</li> </ul>
7 – colored by juice	<ul style="list-style-type: none"> <li>- good level of firmness and sturdiness but also a little squishy – not very much but it still has a little bit of flexibility</li> </ul>	<ul style="list-style-type: none"> <li>- insanely intolerable smell (this wouldn't usually be an issue but the scent cannot go unnoticed).</li> <li>- showed minimal signs of progress in the process of biodegradation</li> </ul>
8 – clear	<ul style="list-style-type: none"> <li>- so firm and stays true to its size for the most part</li> <li>- super good for harder plastic items like tupperware, silverware, etc.</li> <li>- biodegrades, in small amounts at least, quickly in all water samples. did take a smidge longer in saltwater</li> </ul>	<ul style="list-style-type: none"> <li>- not a huge issue but a little difficult to get it clear even with zero color added. transparency is a key attribute of plastic so if this is the best one through testing, the transparency could be a problem</li> </ul>

### **Sources for Materials, Cooking Procedures, etc.**

Recipe 1 (green) – <https://www.wikihow.com/Make-Bioplastic?scrlybrkr=65b2360d#Using-Cornstarch-and-Vinegar>

Recipe 2 (red) – <https://www.wikihow.com/Make-Bioplastic?scrlybrkr=65b2360d#Using-Cornstarch-and-Vinegar>

Recipe 3 (yellow) – <https://www.instructables.com/Easy-Biodegradable-Plastic/>

Recipe 4 (blue) – <https://www.instructables.com/Make-Your-Own-Bioplastics/>

Recipe 5 (peach/orange) – <https://www.instructables.com/Make-Your-Own-Bioplastics/>

Recipe 6 (purple) – <https://www.instructables.com/Make-Your-Own-Bioplastics/>

Recipe 7 (colored by juice) – <https://www.instructables.com/Make-Your-Own-Bioplastics/>

Recipe 8 (clear) – <https://www.instructables.com/Make-Your-Own-Bioplastics/>