



Jul 25, 2021

# Orange peel | Chitosan | Hemp

Jil A Berenblum Phoenix Lai Esther Chang Anna Lu<sup>1</sup><sup>1</sup>Research Group

In Development

Share

This protocol is published without a DOI.

Materialom

Charlene

Charlene Smith

## ABSTRACT

### Orange peel | Chitosan | Hemp

## PROTOCOL CITATION

Jil A Berenblum Phoenix Lai Esther Chang Anna Lu 2021. Orange peel | Chitosan | Hemp. [protocols.io](https://protocols.io/view/orange-peel-chitosan-hemp-bwvvue6w)  
<https://protocols.io/view/orange-peel-chitosan-hemp-bwvvue6w>

## LICENSE

This is an open access protocol distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited

## CREATED

Jul 25, 2021

## LAST MODIFIED

Jul 25, 2021

## PROTOCOL INTEGER ID

51860

## MATERIALS TEXT

Water, Vinegar, Gluten Powder, Hemp Protein Powder, Chitosan, Hemp Protein Powder, Orange Peel

- 1 Remove the peel from an orange(we used Citrus Sinensis Navel Oranges from Florida). While the peel is still fresh, blend it into small granules. The size of the granules can affect the characteristics of the end material.
- 2 In a bowl, combine the Hemp Protein Powder **56 g** , Gluten **56 g** , and granulated Orange Peel **90 g** . Mix the ingredients together until they become evenly distributed. The mixture should resemble a light brown powder with visible orange specs. Set this bowl aside.
- 3 In a separate bowl, stir together the water and vinegar **180 mL** . The water and vinegar should be at room temperature before they are combined.
- 4 Incorporate the chitosan **13.5 g** into the water/ vinegar solution in small parts. Be sure to add the chitosan slowly while constantly mixing so that the chitosan can dissolve evenly into the solution.
- 5 Slowly add the chitosan/vinegar/water **45 mL** solution into the bowl containing Hemp Protein Powder/ Gluten/

Orange peel. Bring the mixture together with a silicone spatula as the solution is added. Switch to hand kneading the material if the Chitosan and the gluten become too sticky for the spatula. Stop mixing when the material resembles a brown dough like consistency.

- 6 Press the material into a mold or onto a cooking sheet. Place in the oven at 200F until dry or leave the mixture to air dry for a few days.
- 7 *As part of a biodesign research group, we reimagined where waste products could be used. This material looks to live harmoniously with the lifetime of product use, so by using all natural ingredients, it biodegrades sooner rather than later. This also creates a collaboration between different industries and people as the ingredients are usually discarded. Essentially building a material to create with nature. Through this material, we were able to build strong vessels that can be sanded, oiled, and shaped through molding or high power tools such as the bandsaw and drill.*