MEDNET

Model Exchange & Development of Nursing & Engineering Technologies

Gelatin Wounds

MEDNET File: Gelatin_Wounds.zip

Description

Gelatin wounds are an edible, cost efficient way to simulate realistic mass casualty situations. A variety of wounds, such as bullet entry, bullet exit, and knife cut, as well as other skin abnormalities, such as blisters and rashes, can be simulated using gelatin wounds. Practicing on wounds that are realistic in appearance put those in the medical field at a huge advantage when they are faced with a real life situation.

Features

Each type of wound can be mass produced using a reusable silicone mold that is made inside a 3D printed mold. Therefore, once a mold has been printed and filled with silicone, that type of wound can be produced indefinitely inside of the same mold. This makes these models both cost efficient and environmentally friendly.

Development Information

Finished dimensions: Unflavored gelatin, Glycerin, Tap water, Wilton icing color (color depends on desired skin tone, but the colors usually used are ivory, copper, and brown), Baking powder, Microwave safe bowl, Measuring spoons/cups, Stirring utensils, PLA filament, Silicone rubber compound, and silicone mold release

Unflavored gelatin ≈ 2 Tbsp

Glycerin ≈ 2 Tbsp

Tap water ≈ 2 Tbsp

(The gelatin, glycerin, and water is at a 1:1:1 ratio, so you can make the batch as large as you would like.)

Wilton icing color (usually ivory, copper, or brown) ≈ enough to get the skin color you desire

Baking powder ≈ enough to brush on the top of the wounds to achieve a matte finish
PLA filaments ≈ 0.02 - 0.04 of a roll (depends on the wound you choose and the size)
Silicone rubber compound ≈ 100 grams of part A and 10 grams of part B
(You can eyeball the silicone for each wound mold, but make sure it is at a 10:1 ratio.)
Silicone mold release ≈ Spray just enough on the inside of the mold before you pour the silicone in, so the silicone does not stick.
Production time ≈ 30 hours
Approximate materials cost: $3.50 (per wound)

Instructions for Use

For the molds:

- Making the mold for each wound can be a bit of a lengthy process. However, once the mold is created once, it can be used to create as many wounds as needed. Spending more time on the front end of the process saves a lot of time in the long run.
- First, you will 3D print the mold of your choice using the appropriate STL file (these are all available in MEDNET). For the print, PLA filament should be used.
- Once the plastic mold has been printed, it will be filled with a silicone mold that allows for wounds that are more realistic and easier to work with. In a disposable container, combine 1 part Silicone Rubber Compound Part B for every 10 parts Silicone Rubber Compound Part A. The amount used should be eyeballed such that it should fill the plastic mold.
- Use a disposable stirring utensil to mix these two substances until a uniform, pink mixture is formed. It is important to note that this mixture is EXTREMELY sticky, and does not wash off easily with soap and water. This is the reason for the disposable items, and gloves are recommended to keep the mixture from getting all over the mixer's hands.
- It is also important to note that this mixture has a 45 minute pot life, so once the two substances have been combined, there is only a 45 minute window of availability for pouring the silicone into the plastic mold.
- Within this 45 minute window, spray the inside of the plastic mold with the silicone mold release. This allows for easy removal of the silicone mold once it has cured.
- Then, pour the silicone mixture into the plastic mold, filling it very close to the top but not allowing it to spill over. This should be left to cure for at least 24 hours.
- After 24 hours, the silicone mold should have hardened, and it is ready to be removed.
- To remove it, I often use a butter knife or similar object to wedge between the plastic and silicone and remove the silicone mold. Now the wounds are ready to be made!

For the gelatin mixture:

- In the following procedure, two tablespoons of each ingredient are used (this results in a small batch size). Note that the amount of each part can be altered so long as the ratio between ingredients remains the same.
- In a small microwave safe bowl, add two (2) tablespoons of gelatin (if using envelopes, one envelope is about one (1) tablespoon), two (2) tablespoons of glycerin, and two (2) tablespoons of tap water.
- Use stirring utensil to stir the mixture vigorously until fully combined (no clumps of gelatin should remain in the mixture).
- Place mixture in the microwave for a few seconds to create a more liquid substance (I did 7 seconds for a mixture of this size, but I would not recommend doing more than 10 second intervals no matter the size of the mixture to prevent the mixture from burning).
- If making a large batch, you may need to do multiple microwave intervals, stirring in between each until a liquid mixture that drips off the spoon is formed.
- Add Wilton icing color at this time if choosing to use it (be conservative with the amount you use, because it does not take much to pigment the mixture).
- Stir in the icing color with the stirring utensil until fully combined (don't worry if the mixture starts to solidify a bit!).
- Place the mixture in the microwave until it liquefies again (I did another 7 seconds).
- Once the desired consistency and pigment is reached, the mixture is ready for either storage or use.

To make a wound:

- You will need some of the heated up gelatin mixture (this can either be a fresh batch or a reheated old batch). The mixture should be poured into the silicone mold until it fills every divot that represents the wound and creates a thin film in the surrounding depth (should not completely fill this depth if a realistic looking wound is desired).
- Allow this to completely dry before carefully peeling the wound from the mold. Mastering this part may take practice, but once you have it down, the wounds can be produced in bulk so easily!
- Just like the gelatin mixture, the wounds can be stored at room temperature, in the refrigerator, or in the freezer. If storing in the refrigerator or freezer, be sure to allow the wounds to reach room temperature before applying them to the skin.
- To apply the wounds to the skin the most effective way is to use elmer's glue.

Material Procurement Information

Gelatin powder: Knox unflavored gelatin: 1 pound - $15.00
https://www.amazon.com/Knox-Unflavored-Gelatin-1-lb/dp/B001UOW7D8/ref=sr_1_5?crid=WTCS8XJ675B0&dchild=1&keywords=gelatin+powder&qid=1591278185&sprefix=gelatin+%2Caps%2C161&sr=8-5

Glycerin: Now Vegetable Glycerin: 16 oz - $14.56
https://www.walmart.com/ip/Now-Vegetable-Glycerin-16-fl-oz/115528309

Wilton icing colors: Here are links to the three different colors we recommend - 1 oz $2.39
Copper: https://www.wilton.com/copper-icing-color-1-ounce/610-450.html
Ivory: https://www.wilton.com/copper-icing-color-1-ounce/610-450.html
Brown: https://www.wilton.com/copper-icing-color-1-ounce/610-450.html

Baking Powder: Davis Baking Powder - 8.1 oz, $7.34
https://www.amazon.com/Davis-Double-Acting-Baking-Powder/dp/B005ER56CG/ref=sr_1_1?dchild=1&keywords=baking+powder&qid=1599755198&sr=8-1

Silicone: Mold Star 20T Silicone Mold Making Rubber - Trial Unit - $42.62 (2.45 lb)
https://www.amazon.com/Mold-Star-Silicone-Making-Rubber/dp/B00LU4YFK6/ref=sr_1_1?dchild=1&keywords=mold+max+20&qid=1592326862&sr=8-1

Filament: Hatchbox Filament 1.75mm - $22.99/roll (prices vary per color)
https://www.amazon.com/HATCHBOX-3D-Filament-Dimensional-Accuracy/dp/B00J0ECR5I/ref=sr_1_4?crid=2GJUX43SIM4TP&dchild=1&keywords=pla+filament+1.75mm&qid=1590077168&sprefix=pla+filament%2Caps%2C178&sr=8-4

Silicon Mold Release: Smooth-On Universal Mold Release - 14 oz, 21.79
https://www.amazon.com/Smooth-Universal-Mold-Release-fl/dp/B004BNHLOK/ref=sr_1_2?dchild=1&keywords=Smooth-On+Mold+Max+20+Silicone+Rubber+Compound-+Smooth+On%27s+website&qid=1599755545&sr=8-2

*citation: Ursprung, C. Gelatin Wounds. MED-NET. Retrieved from uahmednet.org.