Laboratory experiment Date: _____

Gellan hydrogels for wound care - manufacturing and testing

Team names:

_____ _____

_____ _____

Manufacturing Process:

Step 1: Bring 500mL of water to a rolling boil in the 1L pan. Make sure pan is covered.

BE CAREFUL!!!

Step 2: Pour water into blender with at least a 1L capacity. Immediately add 12.5g or 4.5 teaspoons of gellan gum powder. This will create a ~2.5% solution.

Step 3: Blend on high for 20-25 seconds.

IMPORTANT!!!: If the blender container is sealed, crack lid every ~5 seconds to allow pressure to escape.

Step 4: Immediately fill (to about ¾ height) 2 of the 4 molds with the gellan foam.

Step 5: Pour the remaining solution back into the 1L pan or beaker and simmer on medium just so the solution is barely boiling. Stir gently and continuously for 2-3 minutes allowing the air bubbles to escape. The gellan will form a film on the stir but you can scrape off and add the gellan back into the pan as it will dissolve again.

Step 6: Fill the remaining 2 molds (to about ¾ height) with gellan solution.

Step 7: Allow to cool (can be overnight or in a refrigerator).

Data:

Measure dimensions of your mold: length (mm) and width (w) (these are the length and width of your samples) then measure the thickness (t) of your samples (if the top is not flat, take an average of the edge and the center). Then weigh your samples (W) and calculate density (D) were $\mathbf{D = W/l \times w \times t}$.

Sample	Length (l, mm)	Width (w, mm)	Thickness (t, mm)	Weight (W, g)	Density (D, g/mm^3)
1					
2					
3					
4					

Testing Process:

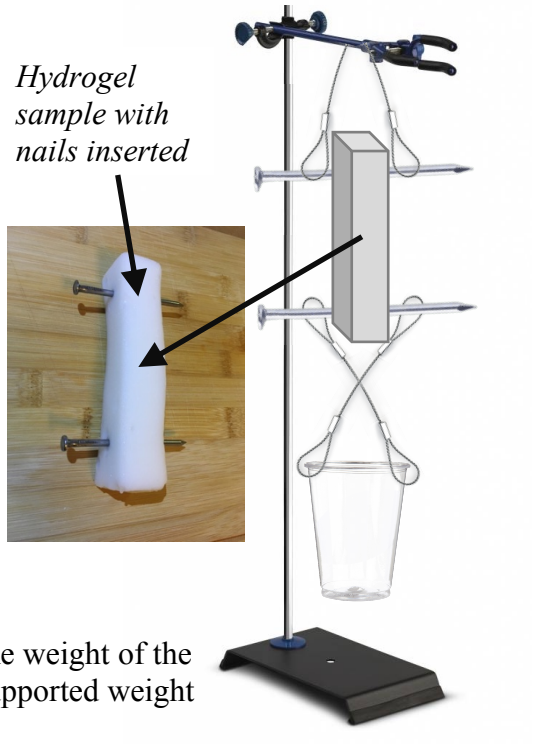
Step 1: Weigh the empty cup (We) and attached wire. Record value below.

Step 2: Measure the diameter of the nail or other object used to support the sample. Record the value below.

Step 3: Insert nail into sample ~1" from the end. See figure at right.

Step 4: Assemble the test fixture as shown at right.

Step 5: Pour 1/8 cup of rice into the cup and wait 20 seconds to see if the sample can support the weight. If it can, add another 1/8 cup of rice and wait another 20 seconds. Continue until the sample breaks. When the sample breaks, remove the last 1/8 cup of rice.



Step 7: Weigh the cup filled with rice (Wf) and subtract the weight of the empty cup (We) and wire. This is the maximum supported weight (Wmax). Record the values on the worksheet.

Step 8: Calculate the maximum shear stress Smax = Wmax/DN×t (g/mm^2). To convert this value to Pascals (Pa) multiply by 9806.

Step 9: Do this measurement and calculation for all samples and complete the worksheet.

Step 10: Analyze the data and discus!

Data:

Sample	Density* (g/mm^3)	We (g)	Wf (g)	Wmax (g)	DN (mm)	T (mm)	Smax (g/mm^2)	Smax (Pa)
1								
2								
3								
4								

**Density from previous calculation above*

Discussion

Was the density of the first 2 samples less? If not, what could have happened? Was there a correlation between sample density and the maximum shear stress? If you have access to a computer, plot sample density vs. Smax. What is the relationship? If there is no correlation, what could be the cause? What did you expect? How would you change the experiment?