

# Measuring bioplastic ultimate strength

*How strong is bioplastic?*

## Materials

ring stand  
2 - S-hook clips  
bioplastic sample  
scissors  
ruler  
caliper  
electrical tape  
scale

## Procedure

1. Cut the bioplastic sample to approximately 1.7 cm long by 9 cm wide. *If using an ice tray to mold bioplastic, you may skip this step.*
2. Measure the initial thickness (in millimeters) and width (in millimeters) of the bioplastic sample using a caliper. Record in the data table below.
3. Cut two pieces of tape that are approximately 9 cm long. Wrap each end of the bioplastic sample with tape.
4. Place a clip on each end of the bioplastic sample. The clip should clamp only on the tape.
5. Hang the bioplastic sample on the ring stand using one of the S-hook clips.
6. Attach the scale to the bottom of the sample.
7. Pull the sample until the sample breaks.
8. Record the reading from the scale at the point of failure.

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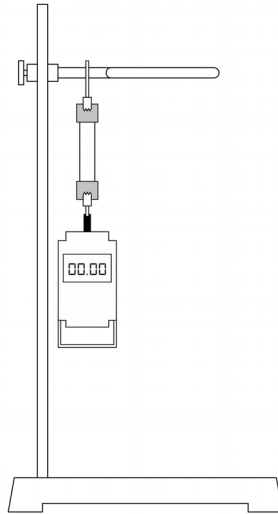


Figure 1. Experiment setup for testing bioplastic tensile strength

## Data

<b>Sample Width (mm)</b>	
<b>Sample Thickness (mm)</b>	
<b>Scale Reading at Failure (kg)</b>	

## Calculations

1. Calculate the initial cross-sectional area,  $A$ , of the sample by multiplying the width x thickness.

<b>Cross Sectional Area (mm<sup>2</sup>)</b>	
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2. Using the formula below, calculate the maximum tensile stress,  $\sigma$ , (*in kPa*) using the cross sectional area,  $A$ , (*in mm<sup>2</sup>*) and the mass,  $m$ , (*in grams*).

*Note: mass is converted to grams for this calculation.*

$$\sigma = \frac{9.81m}{A}$$

<b>Maximum Tensile Stress (kPa)</b>	
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