

Jelly Cups Gel Strength Analysis

Gel strength testing for jelly cups is essential for quality control, as it evaluates firmness and breakage point, which are crucial for ensuring consistent texture across flavors. These metrics help manufacturers assess the jelly's structural integrity and brittleness, key factors in consumer satisfaction.

Background:

- Gel strength in jelly is influenced by the ingredients and setting process, affecting firmness and elasticity. This test uses a hemispherical probe to replicate the force needed to penetrate the gel, mimicking the texture sensation a consumer experiences when pressing the jelly.

Equipment and Settings:

- CTX Texture Analyzer with 5kg load cell
- Probe: 12 mm diameter hemispherical probe
- Sample Holder: Specially designed to support conical jelly containers for consistent positioning
- Texture Pro Software
- Test Parameters:
 - Mode: Normal
 - Trigger Force: 4.5 g
 - Distance: 20 mm
 - Speed: 1 mm/s

Procedure:

1. Place each jelly sample in the specially designed holder, positioning it centrally under the probe.
2. Penetrate the jelly to 20 mm, recording the force required to break the gel structure.
3. Repeat for each flavor, taking an average of three readings per sample to ensure accuracy.



Figure 1

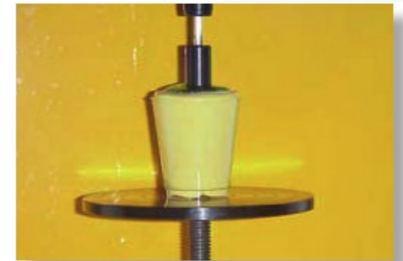


Figure 2: A probe travels into the sample in a controlled manner while the Texture Analyzer collects load response.

Observations:

- Figure I: Shows the conical shape of the jelly cup supported in the holder during testing.
- Figure II: Illustrates the probe's movement into the sample as it measures load response.
- Figure III: Load vs. Distance graph displays the relationship between penetration depth and force, with peak force marking the gel's break point.

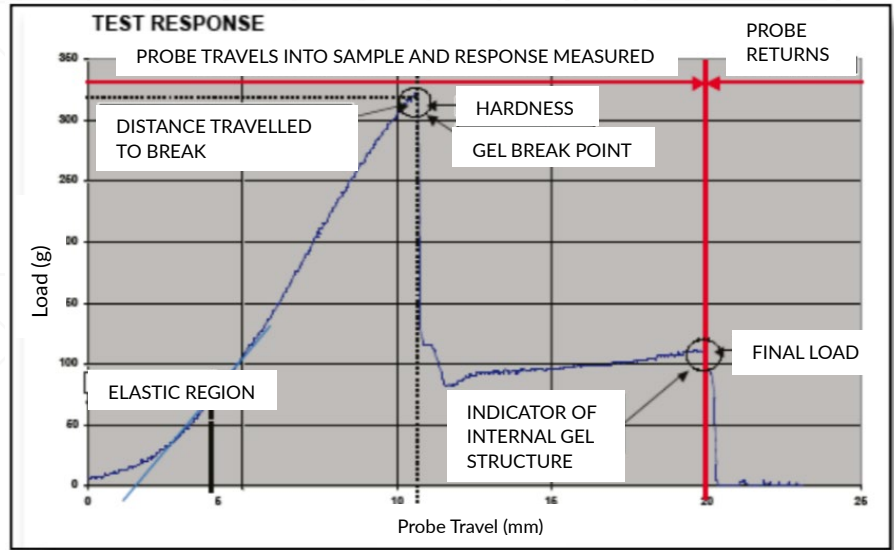


Figure III

Results:

- Hardness (Peak Force): Average peak force across samples is 323.67 g, with a range from 276 g to 361 g.
- Apparent Modulus (Elasticity Measure): Average modulus is 16.19 g/s.
- Hardness at 20 mm Depth: Ranges from 92 g to 120.2 g, with an average of 107.95 g.

| SELECTED CALCULATIONS | sample_01 | sample_02 | sample_03 | sample_04 | sample_05 | sample_06 | Arithmetic Mean | Standard Deviation | Lowest | Highest | Units |
|-----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------------|--------------------|--------|---------|-------|
| Peak Hardness | 361.00 | 276.00 | 346.00 | 288.00 | 347.00 | 324.00 | 323.67 | 34.59 | 276.00 | 361.00 | g |
| Apparent Modulus | 18.05 | 13.80 | 17.30 | 14.45 | 17.35 | 16.20 | 16.19 | 7.72 | 13.80 | 18.05 | g/s |
| Hardness at 20 mm | 120.20 | 92.00 | 115.30 | 96.50 | 115.70 | 108.00 | 107.95 | 11.40 | 92.00 | 120.20 | g |

Discussion:

The peak force measures the jelly's hardness, indicating the force required to break the gel. The apparent modulus reflects elasticity within the elastic deformation region, while the hardness at 20 mm provides additional firmness data. This method is effective for quality control in identifying break load and other texture attributes, essential for ensuring a consistent product experience across flavors.