

Cheese Puffs Texture Analysis

Understanding the hardness and crunchiness of cheese puffs is crucial for ensuring product quality, optimizing production processes, and meeting consumer expectations. Texture influences sensory attributes like mouthfeel and consumer preference, which are key for brand loyalty and satisfaction.

Test Principle:

- Evaluate the hardness of cheese puffs by bulk compression using an Ottawa Cell to measure the force required to crush the sample and the work done.

Background:

- Cheese puffs are popular snacks made from extruded cornmeal. Texture is influenced by cornmeal type and moisture content:
- Gritty cornmeal results in an undesirable mouthfeel.
- High moisture content produces heavy, hard puffs.
- Low moisture content produces light, dry puffs prone to burning.
- The CTX Texture Analyzer with the Ottawa Cell fixture measures hardness and crunchiness by determining the maximum force required to crush cheese puffs, and the energy needed to break their internal bonds.



Equipment:

- Instrument: CTX with 50 kg load cell
- Fixture: Ottawa Cell (TA-OC), Fixture Base Table (TA-BT-KIT), Plunger
- Software: Texture Pro Software

Settings:

- Test Type: Compression
- Pre-Test Speed: 1.0 mm/s
- Test Speed: 2.0 mm/s
- Post-Test Speed: 10.0 mm/s
- Target Type: Distance
- Target Value: 30 mm
- Trigger Force: 30 g



Sample Preparation:

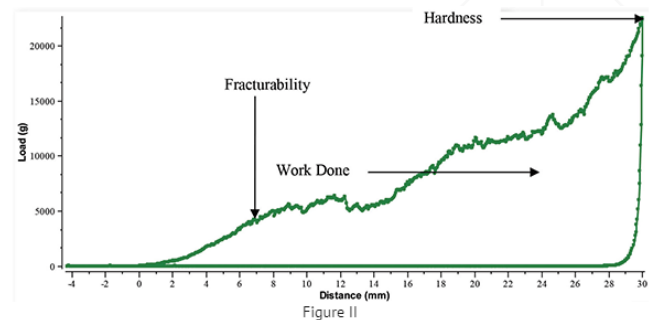
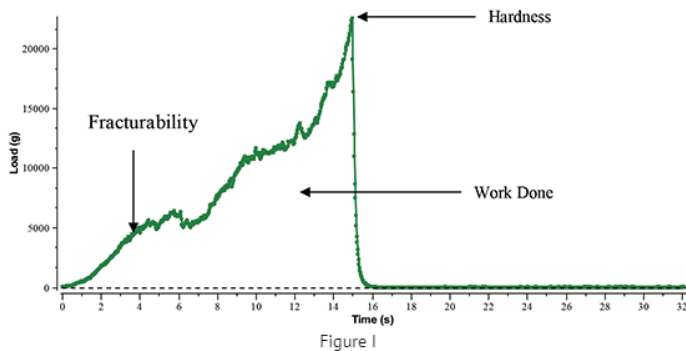
- Remove samples from storage before testing.
- Weigh samples into equal portions (10 g each) to ensure consistency and fill the Ottawa Cell by 60-90%.

Procedure:

1. Attach the plunger to the instrument.
2. Place the fixture base table on the instrument base and secure it.
3. Position the Ottawa Cell on the fixture base table and align it.
4. Adjust the setup to ensure the plunger can move freely without friction.
5. Raise the plunger and place the sample evenly in the Ottawa Cell.
6. Lower the plunger to just above the sample surface.
7. Start the test.
8. Clean the Ottawa Cell between tests to avoid cross-contamination.

Observations:

- When a trigger force of 30 g is detected, the plunger compresses the sample at 2 mm/s over 30 mm before withdrawing.
- Figure I: Load vs. Time graph indicates sample hardness; Figure II: Force vs. Distance graph shows work done to compress the sample.



- The maximum force represents the hardness; the area under the graph represents the work done to crush the sample.

Results:

- Hardness: 22,545 g
- Hardness Work Done: 2,346.5 mJ
- Fracturability: 4,015 g
- Quantity of Fractures: 31

Discussion:

- The higher the maximum force value, the harder the sample, indicating the force required to crush the cheese puffs. The larger the area under the graph, the more energy required to chew the sample and break its internal bonds.
- Fracturability reflects the sample's brittleness, while the quantity of fractures indicates its crunchiness.

Conclusion:

- These measurements help assess the quality of cheese puffs to meet customer satisfaction, optimize product formulation, and maintain consistency in production. They are valuable for developing the ideal sensory features of the product, including texture and crunchiness.