

Caramel Candy Texture Analysis

This analysis will Quantify the firmness (hardness) and adhesive force of caramel candy samples using a CTX Texture Analyzer, a 10 mm spherical probe (TA38), and a Fixture Base Table.



Figure 1

Background:

- Caramel is made from cooked sugar syrup with cream and butter.
- The test compresses caramel candy to a set distance, measuring the force required to deform the sample and the adhesive force when the probe retracts.

Equipment:

- CTX Texture Analyzer with a 10 kg load cell (Fig. 2)
- Fixture Base Table (TA-BT-KIT)
- 10 mm Spherical Probe (TA38) (Fig. 3)
- Texture Pro Software

Test Settings:

- Type: Compression
- Target Distance: 5 mm
- Trigger Load: 10 g
- Test Speed: 1 mm/s

Procedure:

1. Attach the TA38 probe to the CTX Analyzer.
2. Secure the Fixture Base Table with bolts.
3. Align the probe and sample to the center.
4. Position the probe 4 mm above the sample.
5. Set test parameters in Texture Pro software.
6. Run the test and clean the probe after each test.
7. Repeat steps for all samples.



Figure 2 -
CTX with a 10 kg Load Cell (XCTX)



Figure 3 -
10 mm Spherical
Probe (TA38)



Figure 4

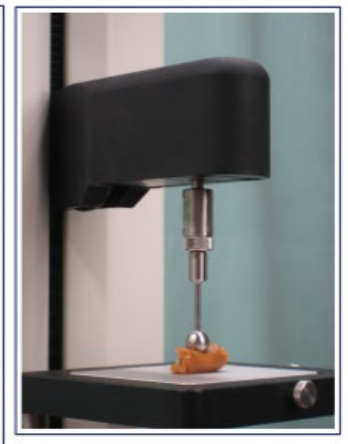


Figure 5

Observations:

- At a trigger load of 10 g, the probe compresses the caramel at 1 mm/s to a 5 mm distance, then retracts.
- Load vs. Time Graph (Fig. 6):
- Positive Peak Load indicates hardness (force required to compress candy).
- Negative Peak Load indicates adhesive force (force needed to extract the probe).

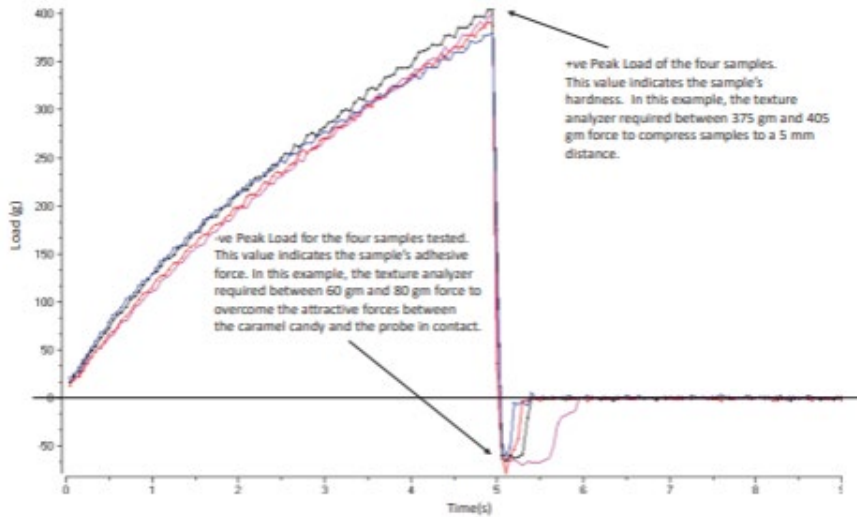


Figure 6 - The Load vs. Time graph comparing the hardness and adhesive force of the four caramel candy samples

Results:

- Hardness: Positive Peak Load ranged between 375 g and 405 g.
- Adhesive Force: Negative Peak Load ranged between 60 g and 80 g.
- Average hardness was 394 g; average adhesive force was 68 g (Fig. 7).

#	Sample Description		Result	Hardness Cycle 1	Hardness Work Cycle 1	Adhesive Force	Adhesiveness
	Product Name	Batch Name	Sample	g	mJ	g	mJ
1	Warell	Caramel Candy	1	379.00	11.20	60.00	0.10
2	Warell	Caramel Candy	3	404.00	11.30	65.00	0.20
3	Warell	Caramel Candy	4	391.00	10.80	77.00	0.20
4	Warell	Caramel Candy	6	401.00	10.80	70.00	0.50
			Minimum	379.00	10.80	60.00	0.10
			Maximum	404.00	11.30	77.00	0.50
			Average	394.00	11.00	68.00	0.30
			Standard Deviation	11.00	00.30	7.00	0.20

Figure 7 - Statistical results of the tests performed on the four caramel candy samples

Discussion:

- Hardness (Cycle 1) is measured by the maximum load value or positive Peak Load. Higher values indicate harder samples.
- Adhesive force is measured by the maximum negative force during probe retraction.
- The results show an average hardness of 394 g and an adhesive force of 68 g.

Data Report:

Texture Pro software measured key parameters:

- Positive Peak Load (Hardness Cycle 1)
- Hardness Work Done (Hardness Work Cycle 1)
- Negative Peak Load (Adhesive Force)
- Total area under the negative curve (Adhesiveness)

Conclusion:

- The test determines the ideal firmness and adhesiveness of caramel candy.
- Consistent procedures and equipment setup ensure reproducible results.