

## Revised AACC Method 10-52 —Micro Sugar-Snap Cookie Method

### Objective

In North America, “cookie” is a product similar to what is internationally known as “biscuit.” Cookie quality is determined (in two sugar-snap cookies) by width (*W*) and thickness (*T*). The formulation uses 40 g of flour, in a small pin mixer, and a constant amount of water added to dough. Nonfat dried milk is used to aid in developing brown color. This method predicts the general quality of soft wheat flour for production of contemporary cookie and pastry products (except cake and crackers). High quality of pastry flours is usually associated with larger sugar-snap cookie diameter. The method is also useful to evaluate other flour types, various flour treatments, and other factors, such as ingredients, that affect cookie geometry.

### Apparatus

1. National cookie dough micromixer, with head speed of 172 rpm and special cookie dough bowl.
2. Electric mixer, with timer control. Use appropriate beater furnished with mixer.
3. Aluminum cookie sheet, 3003-H14 aluminum alloy, about 2.0 mm (0.08 in.) thickness, size 30.5 × 40.6 cm (12 × 16 in.) or 25.4 × 33.0 cm (10 × 13 in.), or other sizes required to accommodate oven doors and shelves. See Note 1.
4. Metal gauge strips, two, 7 mm (0.275 in.) thick and length of baking sheets. Strips can be attached to long edges of sheets. Strips should be kept clean of any buildup of grease residue. See Note 1.
5. Rolling pin, 5.7–7.0 cm (2.25–2.75 in.) diameter. If wood, check often for any wear to edges from rolling along gauge strips.
6. Cookie cutter, 60 mm inside diameter. See Note 1.
7. Small plastic spatula, ground flat at end with notch cut to fit mixing bowl pins.
8. Baking oven, reel or rotary, with hearth consisting of ceramic-fiber reinforced structural alumina refractory product (6.4 mm [ $\frac{1}{4}$  in.] thick) as shelf liner cut to dimensions of and placed on steel baking shelf. Oven shelves consisting of wire mesh baking surface are also suitable and may not need shelf liner (to prevent excessive bottom browning). Oven should be electrically heated and capable of maintaining temperature range of  $\pm 2$  at 205° ( $\pm 5$  at 400°F).

### Reagents

1. Solution A. Dissolve 79.8g sodium bicarbonate ( $\text{NaHCO}_3$ ) in distilled or deionized water and made to 1 L.
2. Solution B. Dissolve 101.6g ammonium chloride ( $\text{NH}_4\text{Cl}$ ) and 88.8g sodium chloride ( $\text{NaCl}$ ) in distilled or deionized water and made to 1 L.

## Procedure

### Formula

Ingredients	Weights (g)
Flour, 14% moisture basis (See Table 1)	40
Sucrose	24
Nonfat dry milk	1.2
NaCl (in soln B)	0.18
Sodium bicarbonate	0.40
Sodium bicarbonate (in soln A)	0.32 (in 4 mL)
Ammonium chloride (in soln B)	0.20 (in 2 mL)
Shortening	12.0
Added water <sup>1</sup>	2.7

<sup>1</sup> Based on moisture content of flour, adjusted water was added (see Table 1).

**Table 1. Weights of flour at various moisture contents corresponding to 40-g flour weight at 14% moisture basis, and added water for cookie test formula**

Flour moisture (%)	Added water (g or ml)	Flour weight (g)	Flour moisture (%)	Added Water (g or ml)	Flour weight (g)
9.1	4.9	37.8	12.1	3.6	39.1
9.2	4.9	37.8	12.2	3.5	39.2
9.3	4.8	37.9	12.3	3.5	39.2
9.4	4.7	38.0	12.4	3.4	39.3
9.5	4.7	38.0	12.5	3.4	39.3
9.6	4.6	38.1	12.6	3.3	39.4
9.7	4.6	38.1	12.7	3.3	39.4
9.8	4.6	38.1	12.8	3.3	39.4
9.9	4.5	38.2	12.9	3.2	39.5
10.0	4.5	38.2	13.0	3.2	39.5
10.1	4.4	38.3	13.1	3.1	39.6
10.2	4.4	38.3	13.2	3.1	39.6
10.3	4.3	38.4	13.3	3.0	39.7
10.4	4.3	38.4	13.4	3.0	39.7
10.5	4.3	38.4	13.5	2.9	39.8
10.6	4.2	38.5	13.6	2.9	39.8

10.7	4.2	38.5	13.7	2.8	39.9
10.8	4.1	38.6	13.8	2.8	39.9
10.9	4.1	38.6	13.9	2.7	40.0
11.0	4.0	38.7	14.0	2.7	40.0
11.1	4.0	38.7	14.1	2.7	40.0
11.2	4.0	38.7	14.2	2.6	40.1
11.3	3.9	38.8	14.3	2.6	40.1
11.4	3.9	38.8	14.4	2.5	40.2
11.5	3.8	38.9	14.5	2.5	40.2
11.6	3.8	38.9	14.6	2.4	40.3
11.7	3.7	39.0	14.7	2.4	40.3
11.8	3.7	39.0	14.8	2.3	40.4
11.9	3.7	39.0	14.9	2.3	40.4
12.0	3.6	39.1	15.0	2.2	40.5

**Method** - based on AACC 10-52 micro sugar-snap cookie baking with minor modification.

1. Sift dry ingredients (sucrose, nonfat dry milk, sodium bicarbonate; Table 2) together eight times. Cream these ingredients together with shortening (Crisco, non-trans fat type) using Hobart or Kitchen-Aide mixer, using a paddle attachment, on low speed 1 min, then scrape bowl and paddle; on medium speed 1 min, then scrape; on high speed 30 sec, then scrape; and on high speed 30 sec. Weigh 37.60 g portions of this creamed mass for each cookie-pair baking

**Table 2. Ingredient weights (g) for batch sizes of 20–45 batches**

Ingredient	Number of units to be baked					
	20	25	30	35	40	45
Sucrose <sup>1</sup>	504.0	624.0	744.0	864.0	984.0	1104.0
Nonfat dry milk	25.2	31.2	37.2	43.2	49.2	55.2
Sodium bicarbonate	8.4	10.4	12.4	14.4	16.4	18.4
Shortening	252.0	312.0	372.0	432.0	492.0	552.0

<sup>1</sup> Use any brand of “**baker’s special**” sugar which passes through U.S. No. 30 (600- $\mu$ m openings) wire sieve (see Note 3).

2. Scrape measured creamed mass into cookie dough mixing bowl (National cookie dough micromixer; head speed 172 rpm and using a cookie dough bowl). Add water and solutions as shown in formula: 4.0 mL solution A, 2.0 mL solution B, and 2.7 mL water. Mix 3 min (stopping mixer and scraping after first few sec if shortening is stuck on side of bowl) and scrape with small spatula.

3. Add flour to mixing bowl. Mix a total of 25 sec. Mix for the first 10 sec while tapping side of bowl. Scrape dough from mixer and bowl pins; scrape outer edge and bottom of bowl, pushing dough between pins several times. Mix 5 sec and scrape as just described. Mix 5 sec and scrape. Mix 5 sec and scrape mixer pins.
4. Gently scrape dough from bowl, gently form into a single dough mass and cut with spatula into two equal portions. Transfer to a room-temperature, weighed cookie sheet with gauge strips (see AACCI 10-52 for cookie sheet information: 3003-H14 aluminum alloy, 2.0 mm (0.08”) thick, 30.5 X 40.6 cm (12 X 16”) or 25.4 x 33 cm (10 X 13”) with gauge strips 7mm (0.275”) thick and the length of the cookie sheet). Roll to thickness with one forward and one backward stroke of rolling pin. Cut dough with cookie cutter (60mm inside diameter), discard excess dough, and remove cutter. Measure weight of dough and sheet.
5. Immediately place in 205° C, +/- 2°C (400° F, +/- 5°F) oven (reel or rotary, per AACCI 10-52) and bake for 10 min. Remove sheet from oven, and immediately measure weight of cookie and sheet. Cool 5 min and remove cookies from baking sheet.
6. After cookies have cooled to room temperature (at least 30 min), measure cookie diameter (average diameter of two cookies, divided by 2, and height)

### ***Scoring and data reporting***

1. Calculate weight loss during baking.
2. Measure cookie diameter and stack height; single cookie average.
3. Evaluate top grain on top surface of cookie.

### **Notes**

1. Cookie sheets are purchased with gauge strips fastened to the long edges of sheets. New cookie sheets may be conditioned by lightly greasing and placing in hot oven for 15 min, cooling, and repeating this process two or three more times. Cookie sheets should be washed while warm in water (without any soaps or detergents) and wiped dry after each bake to prevent buildup and blackening of oil on their surface.
2. Dough consistency and stickiness and cookie spread are affected by temperature and humidity. Room and ingredient temperature of  $21 \pm 1^\circ$  ( $70 \pm 2^\circ\text{F}$ ) and relative humidity of 30–50% are recommended. Data variance is increased by conditions in excess of those recommended.
3. Only throughs of U.S. No. 30 (600- $\mu\text{m}$  openings) wire sieve of any brand of “baker’s special” sugar should be used.
4. Nonfat dry milk should be ground, if necessary, to pass through a U.S. No. 30 (589- $\mu\text{m}$  openings) wire sieve.
5. For relatively consistent mixing action, recommended cream mass batch size is 20–45 units. Take amounts of sugar, nonfat dry milk, sodium bicarbonate, and shortening for batches of 20–45 from Table 2.
6. Oven should be warmed to temperature with oven shelves turning. Bake “dummy” cookies out of scrap dough or extra flour to condition oven before making test bake at beginning of baking series or if oven has not been used for 15 min.
7. Top grain is “islanding” pattern on top surface of cookie. Besides being a varietal trait of wheat, absent or unusual top grain can indicate faulty mixing, excessive dough handling, high temperature and humidity, low oven humidity, ingredient variation, or crop year differences.