Effect of long-term storage on baking powder functionality

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**ABSTRACT**

Six samples of double-acting baking powder in original commercial packaging were obtained from donors and two fresh samples were purchased. Sample had an age range of 0 to 29 years and were stored in cool (15-25 °C) and dry conditions. Moisture content of baking powder samples ranged from 1.9-3.1%, total CO2 ranged from 6.6-7.3%, and the control made without baking powder averaged 2.1%. The average volumes (calculated from the average measured heights and diameters) ranged from 96-79 cm³, with the control averaging 47 cm³. Average height and volume did not change over storage time. Mean L* values for baked foods for both samples ranged from 66.0-70.6, 4.0-7.8, and 25.9-31.2, respectively, with control biscuits averaging 70.5, 1.8, and 21.6. Aged baking powder samples produced acceptable biscuits, indicating that baking powder retains its functionality over time and can be included in applications requiring long-term storage.

**RESULTS**

### Percent Moisture and CO2 Evolved

Percent moisture ranged from 1.5-3.2% (Table 1). Total CO2 ranged from 18-21.9% of sample weight and did not significantly decrease over time. It is interesting to note that the sample with the highest moisture had the lowest total CO2.

### Biscuit Dimensions

Figure 3 shows a representative biscuit made from each baking powder sample. The average biscuit volumes ranged from 66-79 cm³ (Table 2), while the control biscuit (made with baking powder) averaged 47 cm³, indicating that all of the baking powder samples leavened the biscuits significantly better than those made without leavening.

### Sensory Quality

All of the biscuit samples received over 95% acceptance for eating in an emergency situation, indicating that all of the baking powder samples made acceptable biscuits. All of the biscuits received over 65% acceptance for eating in an everyday situation (Fig. 4).

### Biscuit Crumb Color

The mean color values ranged from 66-70.5 for L*, 1.5-8.7 for a*, and 18.6-32.4 for b* (Table 3). The higher L* value indicates a lighter color, higher a* means more red hues than green, and higher b* means more yellow hues than blue. The biscuits made without leavening were lighter in color and had more green and blue hues than the biscuits made with any age baking powder.

**METHODS**

**Samples**

Six samples of double-acting baking powder in original commercial packaging were obtained from donors and two fresh samples were purchased. Samples had an age range of 0 to 29 years and were stored in cool (15-25 °C) and dry conditions.

**Percent Moisture and Carbon Dioxide Evolved**

Moisture content was determined gravimetrically using an Ohaus MB 200 moisture balance at 98.5 °C for 10 minutes (Ohaus, Pine Brook, NJ). The moisture content of the samples was determined by drying the samples at 105 °C on a drying oven (Thermo-Scien, Waltham, MA) and reweighing them to determine the moisture content. The moisture content of the samples was calculated from the difference between the initial and final weights of the samples.

**Biscuit Dimensions**

Biscuits were made and compared using AACC method 10-31B. Height, weight, and diameter of 8 biscuits per baking powder sample were measured (Fig. 3) and volume was calculated from these values.

**Biscuit Crumb Color**

Surface crumb color was measured using a Hunter Lab Colorflex Spectrophotometer (Hunter Lab, Reston, VA) to obtain L*, a*, and b* values.

**Sensory Quality**

Biscuits were made following the AACC method 10-31B and compared using AACC method 10-61B. A 9-member consumer panel evaluated appearance, aroma, texture, and overall acceptability of the biscuits using a 9-point hedonic scale. They also rated acceptability for everyday use and emergency use.

**Data Analysis**

Data was analyzed for significance using the Statistical Analysis System (SAS Institute, Cary, NC). PROC GLM was used for the moisture content and carbon dioxide evolution. A mixed model analysis of variance (PROC MIXED) was used for the sensory data. Significant differences were defined by p<0.05.

**REFERENCES**


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