

Alkaline Water Retention Capacity

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Objective

Alkaline water retention capacity (AWRC) is the amount of alkaline water held by flour at 14% moisture basis after centrifugation. AWRC, expressed as percent of flour weight, is inversely correlated with cookie spread. The method is applicable to predicting flour quality for sugar-snap cookies, which are made slightly alkaline by leavening agents.

Apparatus

1. Centrifuge. See Note.
2. Centrifuge tubes, 15-ml, with rubber stoppers. See Note.
3. Balance (accurate to 0.0001 g).
4. Timer
5. Tissue paper.
6. Test tube rack.

Reagent

Sodium bicarbonate (NaHCO_3) solution, 0.1*N*. Dissolve 8.4 g sodium bicarbonate in 1 liter water.

Procedure

1. Weigh 15-ml centrifuge tube with rubber stopper.
2. Weigh 0.9500–1.0000 g flour of known moisture content into centrifuge tube.
3. Add 5 ml 0.1*N* sodium bicarbonate solution.
4. Stopper and shake vigorously to suspend flour. Set timer for 20 min and start.
5. Permit to hydrate 20 min, shaking at 5, 10, 15, and 20 min.
6. Centrifuge at *exactly* 1,000 × gravity for 15 min (not including time to achieve speed). Allow centrifuge to stop without braking.
7. Decant supernatant liquid and drain tube at 45° angle for 5 min; dry lip of tube with tissue paper. Place tube upside down (90°) on tissue paper in test tube rack and drain additional 5 min. Blot again if necessary.
8. Immediately stopper tube and weigh tube, stopper, and gel.

Calculation

$$\% \text{ AWRC} = \left[\frac{\text{tube, stopper, \& gel wt} - \text{tube \& stopper wt}}{\text{flour wt}} - 1 \right] \times \left[\frac{86}{100 - \text{flour moisture}} \right] \times 100$$

Alkaline Water Retention Capacity (continued)

Note

Exact centrifuge speed and proper centrifuge tube size are critical to achieving reproducible data, especially among laboratories.

References

1. Gaines, C. S. 1986. Report of the AACC committee on soft wheat flour: Alkaline water retention capacity—AACC Method 56-10. *Cereal Foods World* 31:837.
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3. Yamazaki, W. T. 1953. An alkaline water retention capacity test for the evaluation of cookie baking potentialities of soft winter wheat flours. *Cereal Chem.* 30:242.
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