
EXPERIMENT 30 DETERMINATION OF GLUTEN CONTENT IN WHEAT FLOUR

Structure

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30.0 OBJECTIVES

After attending to this experiment, we shall be able to :

- learn to perform determination of gluten content in wheat flour.

30.1 INTRODUCTION

The coarse product obtained by milling or grinding, the cereals possesses, the most unique property that its protein forms the cohesive and elastic product called gluten. It is a nitrogenous hydration product of gliadin and glutenin. It is the water insoluble portion of the wheat atta obtained by washing away the starch and bran from the dough. The strength of flour depends upon the gluten content. The strong and hard wheats contain 11-13 % gluten as compared to the soft wheat with lower gluten content (7-8%). The hard wheat is suitable for bread making whereas the soft wheat is suitable for making biscuits and crackers.

30.2 PRINCIPLE

The dough is prepared from flour in a buffered solution of sodium chloride. The wet gluten is then isolated by washing this dough with a buffered solution of sodium chloride, followed by removal of excess washing solution. Desiccation at 130°C for 2 hr and weighing of a ball of gluten obtained.

30.3 REQUIREMENTS

Reagents

Sodium chloride, 20 g/l solution, buffered to pH 6.2 - Dissolve 200 g of NaCl in water; add 7.54 g of potassium dihydrogen phosphate (KH_2PO_4) and 2.46 g of disodium hydrogen phosphate dihydrate ($\text{Na}_2\text{HPO}_4 \cdot 2\text{H}_2\text{O}$). Dilute to 10 litres with water. Prepare a fresh solution daily.

Iodine-approx. 0.001 N solution.

30.4 PROCEDURE

Grind about 100 g of the material in a pestle and mortar or in a suitable food grinder. Sieve through fine treble extra silk with an aperture of 150-micron IS Sieve and collect the material that has passed through. Use this prepared material for the determination of gluten. Weigh accurately into a dish about 25 g of the material. Add about 15 ml of water to the material and make it into a dough, taking care to see that all the material is taken into the dough. Keep the dough gently in a beaker filled with water and let it stand for 1 h. Remove the dough and place it in a piece of bolting silk cloth with an aperture of 150-micron IS Sieve and wash it with a gentle stream of tap water till water passing through the silk does not turn blue when a drop of iodine solution is added to it. Spread the silk tight on a porcelain plate for facilitating scraping. Transfer the residue from the silk by means of a spatula, to a tared porcelain dish. Spread the wet gluten into a thin layer and cut into small pieces. Transfer any residue sticking to the spatula into the porcelain dish. Place the porcelain dish in an air-oven maintained at $133 \pm 2^\circ\text{C}$. Dry for two hours. Cool in a desiccator and weigh.

30.5 CALCULATION

$$\text{Gluten, \% by mass (on dry basis)} = \frac{10\,000 (W_2 - W_1)}{W (100 - M)}$$

Where,

W_2 = weight, in g, of the dish with dry gluten,

W_1 = weight, in g, of the empty dish,

W = weight, in g, of the material taken, and

M = moisture, % in the sample

30.6 RESULTS AND INFERENCE

The difference between the results of two determinations of dry gluten carried out simultaneously or in rapid succession by the same analyst shall not exceed 0.5% of the dry gluten. The strong and hard wheats contain 11-13 % gluten as compared to the soft wheat with lower gluten content (7-8%). The hard wheat is suitable for bread making whereas the soft wheat is suitable for making biscuits and crackers.

30.7 PRECAUTIONS

- Check the washings with iodine solution till the gluten is free from starch.
- Use 150 micron sieve to collect small particles of gluten during washing.