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# EXPERIMENT 2 DETERMINATION OF GLUTEN CONTENT IN WHEAT

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## 2.1 INTRODUCTION

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The strength of the flour is associated with the amount of gluten present in the flour. The dough obtained by mixing wheat flour with water possesses the characteristics of viscosity. Plasticity and elasticity which are significant during handling the dough as well as in its end performance. These properties are due to the interaction of water soluble proteins of wheat with water. The albumins, globulins and other smaller proteins as well as starch are washed along with water leaving behind a cohesive, elastic and rubbery mass called as "Crude wet gluten". Colour of the gluten varies from pale yellow to greenish grey. Weaker gluten generally have yellow colour, while strong gluten will have deeper greenish colour. Gluten from strong wheat are generally extensive and elastic. Hydrated glutenin and gliadin differs in their mechanical property. Gliadin is viscous, sticky mass which is extensible; while glutenin is tough, rubbery elastic mass. Gliadin is more extensible, but less elastic. Gluten exhibits the properties of both the components.

### Objective

After studying and performing this experiment, you should be able to

- Determine the gluten content.

(Scope: It is applicable to wheat flour, semolina and atta)

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## 2.2 EXPERIMENT

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### 2.2.1 Principle

Gluten in a sample of flour can be estimated by hydrating the flour with water and later washing the dough free of starch, sugars, water soluble proteins and other minor components. The wet cohesive, visco elastic mass obtained is referred to as wet gluten while the dried product obtained from it is referred to as dry gluten.

### 2.2.2 Requirements (Equipments/Machinery/Instrument/and Chemicals/Material)

- Hot air oven
- Aluminium dishes/petri plates (small)
- Analytical balance (least count 0.001g)

- Dessicator
- Aluminium foil
- Plastic bowl
- Measuring cylinder
- Glass rod
- Fine sieve

### 2.2.3 Procedure

- Weigh out 25g flour into a plastic bowl.
- Add 15mL water, mix to get a dough ball.
- Immerse the dough ball in water for one hour to ensure proper hydration.
- Wash out the starch by kneading gently in a gentle stream of water over a fine sieve.
- Continue washing till the washed out liquid is clear.
- Squeeze the washed water into clean water.
- If water turns turbid, continue washing.
- The cohesive mass obtained is called wet gluten
- After pressing as dry as possible place in a petri dish containing a small piece of aluminium foil.
- The wet gluten so obtained is dried in a hot air oven at 100°C for 24 hr.
- Weigh the gluten to constant weight.
- The dried gluten is called as dry gluten.

### 2.2.4 Observations

Weight of flour taken = 25g

Let the weight of empty petri dish wash =  $W_1$

Weight of petri dish + wet gluten =  $W_2$   
(before drying)

Weight of petri dish + dry gluten =  $W_3$   
(After drying)

$$\text{Wet gluten (\%)} = \frac{W_2 - W_1}{25} \times 100 - A$$

$$\text{Dry gluten (\%)} = \frac{W_3 - W_1}{25} \times 100 - B$$

On 14% moisture basis

$$\text{Wet gluten (\%)} = \frac{100 - 14}{100 - \text{IM}} \times A$$

$$\text{Dry gluten (\%)} = \frac{100 - 14}{100 - \text{IM}} \times B$$

Where IM – Moisture content of flour

A – Wet gluten content

B – Dry gluten content

### 2.2.5 Results

Calculate gluten content (wet and dry) using the above formulae. The results are displayed along with the moisture basis. Wet gluten for good bread flour falls in the range of 30-36%. Dry gluten for good bread flour falls in the range of 10-12%. While biscuit and cake flour has dry gluten in the range of 7-10.0%.

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## 2.3 PRECAUTIONS

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- Never touch the petri plates with wet hands.
- The dough ball should be completely immersed in water for one hour.
- Dough ball should be washed till it is completely free of starch.
- Wet gluten to be pressed as dry as possible before taking the weight.
- Wet gluten to be dried to constant weight.