Heat Treated Flour

By Dr. Irfan Hashmi

24th Annual IAOM-MEA
District Conference & Expo
Tunisia Nov 5-8, 2013

GrainCorp

Abstract

Technology of heat treated whole wheat flour production is presented here that discusses:

- science behind it
- the technology
- factors affecting the process
- product quality
- benefits

Introduction

- Starch damage enhance the water absorption capacity of the starch, along with the taste and aroma
- This can be achieved by means of an additional operation called **Roasting**, due to that the bulk density decreases (*Bulk density is a measure of mass per unit volume*)
- Starch damaged flour addition makes the breads softer and sweet since starch damage results in aqueous extractability and rapid susceptibility to enzymatic digestion

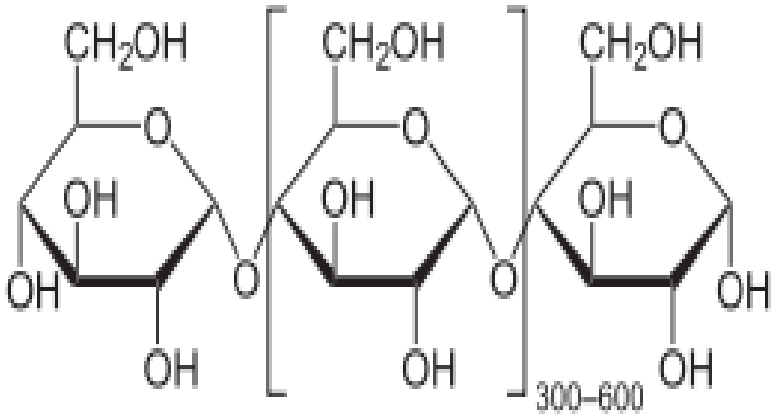
Science

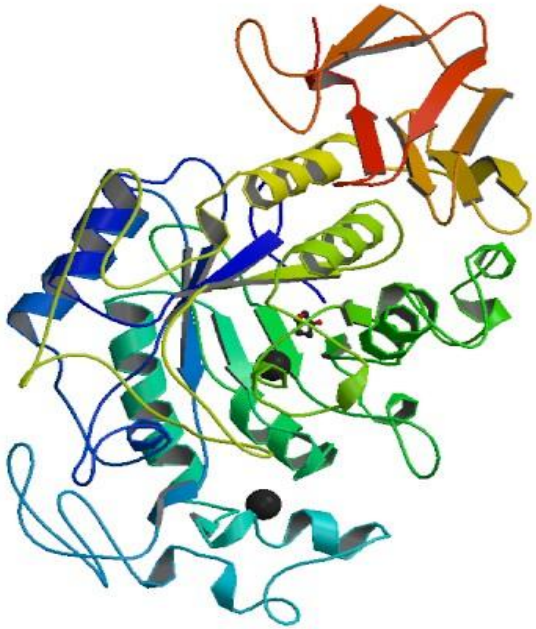
- Starch is composed of two major components:

  1. **Amylase**
  2. **Amylopectin**

Science

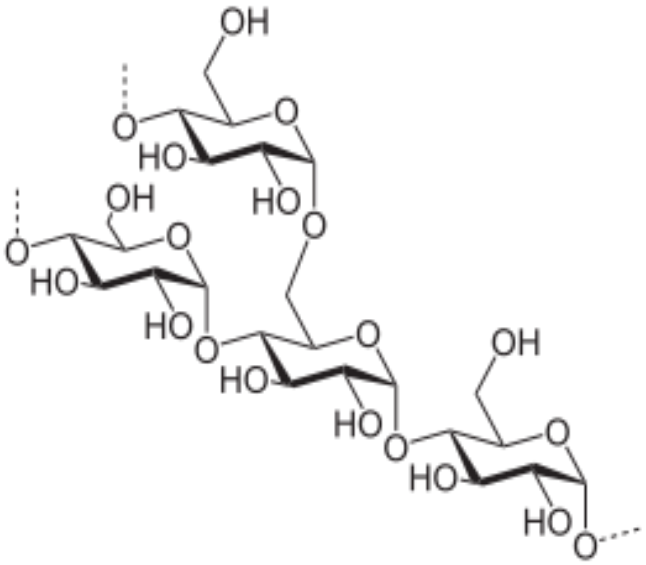
- **Amylase** has linear chain of all glucose linkages

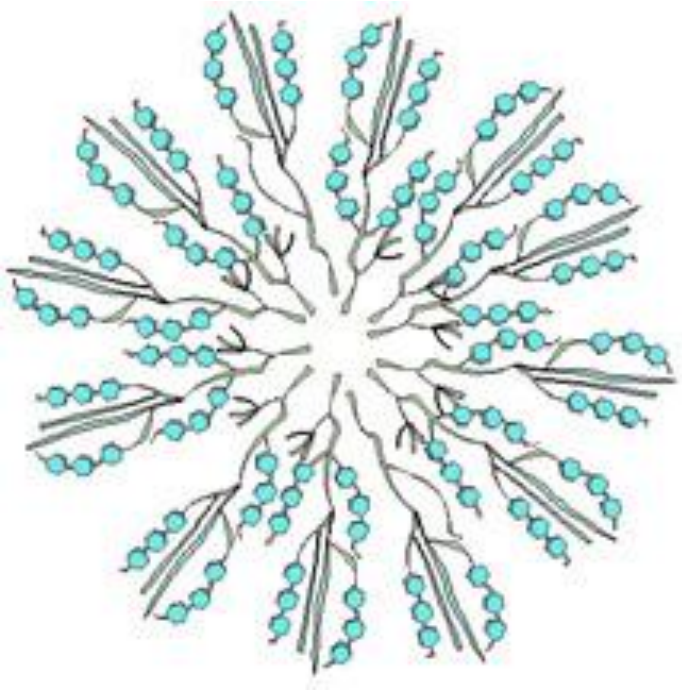




Science

- Where as **Amylopectin** has bush like branched structure





Science

- Upon heating the wheat, amylase activates & fractionates, the branches make Amylopectin a linear chain starch such as Amylase
- Amylase enzymes find use in bread making & to break down complex sugars or starch that is present in flour into simple sugars
- Yeast then feeds on these simple sugars resulting in imparting flavour & causes the bread to rise

Technology

- Raw wheat is soaked in water in HDPE bags for 4-5 hours to raise moisture level to 32%
- After draining water, wheat is dumped in cavity from where it is elevated through bucket elevator with final moisture of 26-27%

Technology

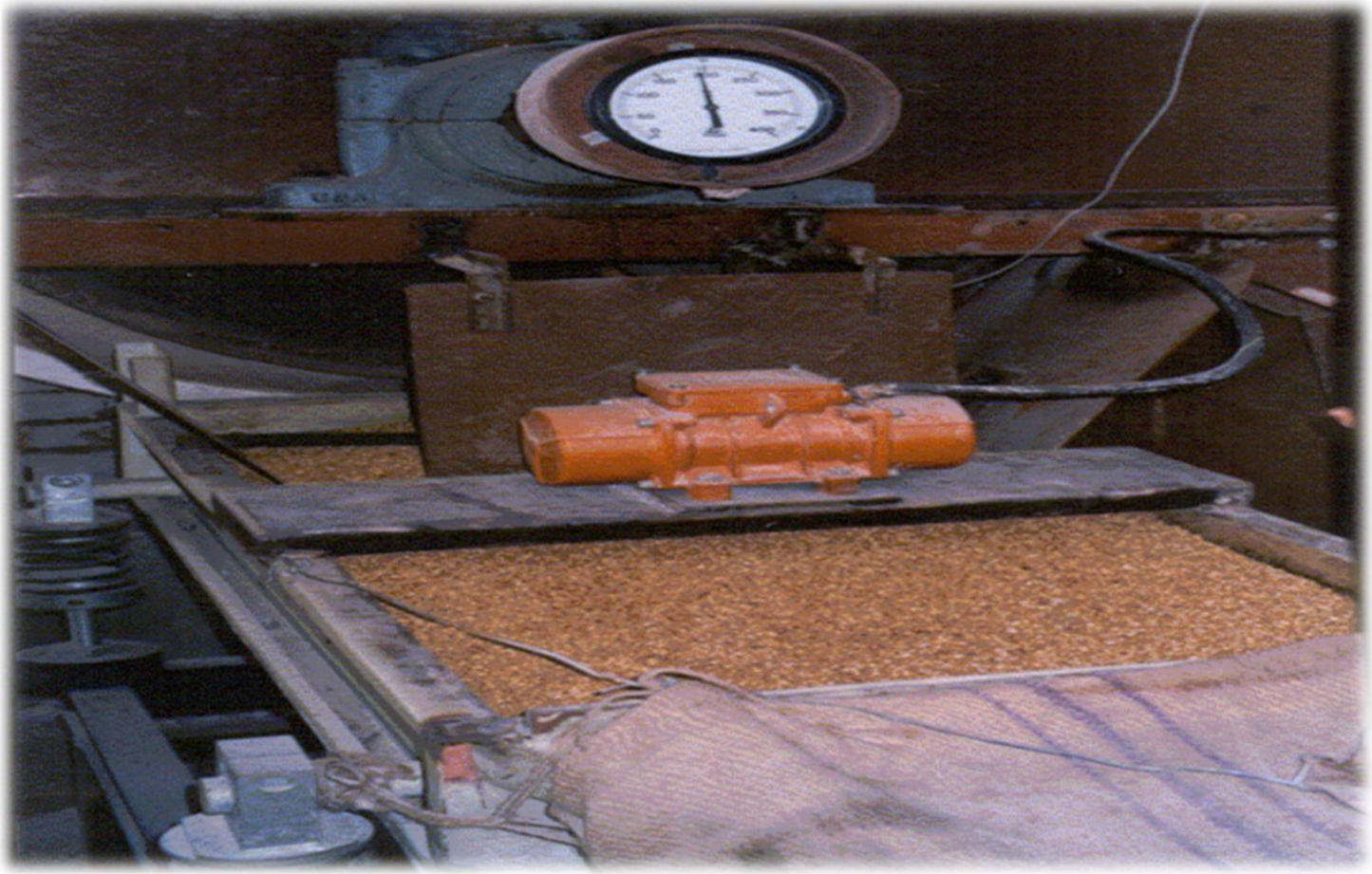
Soaked Wheat Draining

Technology

- Wet wheat is then dried in a process by passing it through a roaster with sodium sulfate (at a ratio of 1:20) at 200^0C for 45 seconds
- Sodium sulfate is separated & recycled back in the roaster whereas the roasted wheat is collected

Note:
Sodium sulfate is widely used as an inert drying agent in laboratories in order to remove traces of water from organic solutions & the same concept is applied in this process

Technology



Roasted Wheat Coming out from the Roaster

Factors that affect the Process

- Feed rate of wheat
- Moisture of wheat before roasting
- RPM of rotating shaft of drum roaster
- Temperature of roasting

Expected Product Quality

- **Grain colour**: yellow to light brown
- **Grain harness**: bite quality
- **Moisture**: 7%
- **Starch damage**: 68% min

Benefits

- "**Starch damaged roasted wheat**" is then milled (in a pin, hammer or stone mill) & resultant flour is blended with whole ground flour from a commercial mill at different ratios to achieve premium quality product that will produce **softer breads** with **higher water absorption** & **better aroma**

Pin-Mill

Hammer-Mill

Stone-Mill

Availability

- A roster like this with an output of half TPH can be fabricated within $150,000

Recommendation

- Recommended to use only **white wheat** as the colour becomes slightly dark during roasting process

Acknowledgement

- Thanks are due to Mr. Mohib Khan of Oman Flour Mills, for his support in investigating this research