

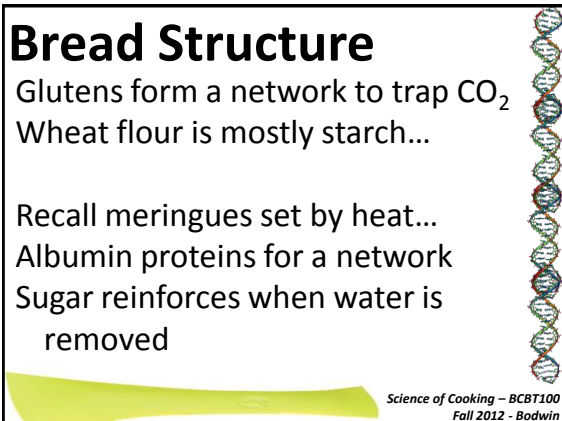
From Last Time:



Bread Structure

Glutens form a network to trap CO_2
Wheat flour is mostly starch...

Recall meringues set by heat...
Albumin proteins for a network
Sugar reinforces when water is removed



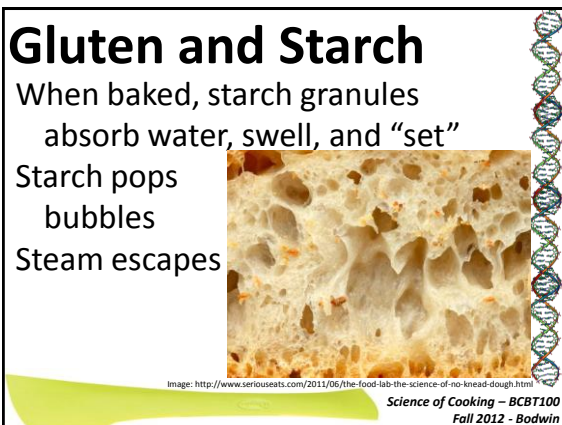
Gluten and Starch

When baked, starch granules
absorb water, swell, and “set”

Starch pops
bubbles
Steam escapes



Image: <http://www.serious-eats.com/2011/06/the-food-lab-the-science-of-no-knead-dough.html>



Baking – Charles' Law

How big do bubbles get?

Assume a 1mL bubble @20°C

heating up to 65°C

Race between expanding gas &
stiffening gluten

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Steam in Baking

Phase changes

Steam transfers heat better

Keeps surface elastic longer

Glossy crust



Image: <http://tic.howstuffworks.com/home/wash-and-dry-with-steam.htm>

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Stale...

Changes in the starch

Gel loses water, crystallizes

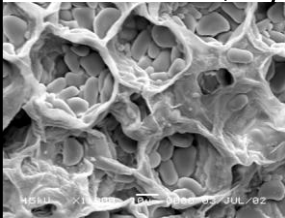


Image: http://www.aroid.org/gallery/field/starch_grains.php

Image: <http://sciencegirlrock.wordpress.com/2011/05/30/women-of-outstanding-achievement/>

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Science to the rescue!

Stale bread can be "fixed"

Consider the food molecules

Starch – need to re-gel

Heat

Storage conditions

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Basic Bread

Ingredients:

3/4 cup warm water

1 package active dry yeast

1 tsp salt

1-1/2 tbsp sugar

1 tbsp vegetable shortening

1/2 cup milk

3 cups flour, approximately

Recipe: <http://breadbaking.about.com/od/yeastbreads/r/1loafbread.htm>

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