Flour Mixtures-Lab 8
NUTR 45300
Food Chemistry

Gluten formation

Electron micrograph of gluten

This is the structure that traps the carbon dioxide leavening gas and causes baked goods to rise.
Formation of gluten requires gliadin, glutenin, water and mixing.

- Provides elasticity and ability to trap leavening gasses.
- Whole wheat-bran punctures air pockets, releases leavening, small baked gluten balls.

- Bread flour—high protein, most gluten produced.
- All purpose flour—less gluten than bread flour.
- Sugar—tenderizer, less gluten.
- Oil—tenderizer, less gluten.
- Monoglycerides—inhibits gluten formation.
Exp 1 Gluten balls
- SSL-promotes disulfide bond formation, helps form gluten but incorporates less air, smaller gluten ball
- NaCl-denatures protein, toughens gluten, makes small gluten ball

Exp 2 Sugar cookies
- Basic recipe-control
- AP flour-more gluten than cookie flour
- Extra cookie flour-more protein, more browning, more gluten formation
- Fat-weaker dough, softer cookie
- Dec temp, inc baking time-drier and browner cookie

Exp 2 Sugar cookies
- Inc thickness-Softer cookie, less water evaporation
- Oatrim gel (50% fat replacement)-not digestible, cake-like cookies
- Oatrim gel and Sweet One (sugar replacer)-turns out OK
- 100% sugar replaced-hard and candy like, very crisp
Exp 2-Oatrim

- This is the material that is used as a partial replacement of fat in the sugar cookies.
- It will be already prepared as a 25% crème (it will look and feel like hydrogenated fat) in water and will be in the refrigerator.
- It is called Oatrim, Beta Trim and other names depending on the manufacturer.

Exp 2-Litesse (polydextrose)

- This is what is used as a bulking agent to replace mass of sugar when sugar is replace by Sweet One.
- It has several commercial names (Sta-Lite, Litesse, etc).

Exp 2-Pastry slats

- These are used to make cookies of uniform thickness.
- Just put a portion of dough between the slats and use the rolling pin to flatten.
Exp 2 - Equipment
- Measure breaking strength with texture analyzer equipped with the knife probe
- Use the cookie sequence file for the measurement

Exp 3 - Chocolate cakes
- Basic recipe - control
- AP flour - higher protein, tougher
- Less baking soda - tastes more chocolatey
- More baking soda - increased volume, darker color, looks more chocolatey
- Monoglycerides - inhibits gluten formation, increases volume

Exp 3 - Measure cake volume
- Measure volume with seed volume apparatus
Exp 3 Measure cake texture
- Measure texture with texture analyzer with small acrylic cylinder probe
- Use cake setting file

Exp 3 Measure cake cross-sectional area with compensating polar planimeter
- Cut cake in half and trace around its outline on butchers paper
- Mark a starting point for the beginning of the planimeter measurement

Exp 3 Measure area of cake cross-sectional area with compensating polar planimeter
- This is step 9 on page 85
- See instructions for planimeter in lab manual, pages 109-110
- This is useful sometimes as cross sectional area is related to volume which in turn is related to texture
Exp 3 Measure color of cakes

- Measures Hunter color parameters L, a, and b with Hunter colorimeter
- Put cake sample in a plastic Petri dish
- Make sure sample is large enough to cover colorimeter port opening to keep stray light from causing a problem with the measurement