

Baking Science Experiment: Flour Absorption and Gluten Development

Question to test:

What difference(s) will you observe when substituting different flours one-for-one with all-purpose flour in a mixture?

Control: Mix each type of flour/water mixture for the same amount of time and at the same speed.

Student name(s): _____ Lab: _____ Date: _____

Our lab compared all-purpose flour with _____ flour _____ flour _____ flour

Hypothesis: _____

Lab Supplies:

Choose 4 or more flours

Use 1/2 cup (2 oz. or 55 grams) of each flour

- All-purpose flour (bleached, unbleached)
- Cake or pastry flour
- Bread flour
- Whole wheat flour (hard red or white OR pastry/soft wheat)
- Corn starch
- Cornmeal, yellow or white
- Rye, barley, oat, sorgum, rice or other non-wheat flour
- Ultragrain® flour www.ultragrain.com

Water (3 oz./85 ml)

Measuring cups or scales

Four or more bowls and electric mixers (use standard beaters, not dough hook).

1,2,3 Report:

1. List the flour type(s) your lab compared.
2. Describe the differences found in the mixtures after 1 minute mixing and 3 minutes total mixing.
 - **Use descriptions such as:** how fluid or stiff; development of batter structure (gluten strands developing, lumpy, no strands), how much water was absorbed (stiff, fluid, medium stiff) batter/dough strength (hard to mix, not hard to mix)
3. Use the **Flour Chart** and the **Need to Know Flour Basics**, (p.26) to help you hypothesize what differences you'll observe.

Basic Experiment: What to do.

1. Scoop each type of flour out of its bag and into a separate bowl; label.
2. Stir each flour or cornmeal with a large spoon to "fluff" or unpack the particles.
3. Spoon flour into a 1/2 cup dry measuring cup, heaping it up, then level it off (do not pack, shake or push down on the flour in the cup); **OR**, use an ingredient scale and weigh 2 oz. or 55 grams of each flour.
4. Put each type of flour in a medium mixing bowl. Label with flour name. Use a liquid measuring cup or beaker, placed on a flat surface. Add 3 oz. (85 g/100ml) cold water.
5. Mix each flour and water mixture on LOW speed 1 minute; record observations. Continue mixing on MEDIUM speed 2 minutes. Record observations. **Be consistent in mixing speed and time.**

| | One Minute Mixing | Three Minutes Mixing |
|--|-------------------|----------------------|
| Bowl 1: All-purpose flour (Control) | | |
| Bowl 2: _____ flour | | |
| Bowl 3: _____ flour | | |
| Bowl 4: _____ flour | | |