Cookie Science
Lisa Pluff
FCS Teacher - Culinary & Baking
Manhattan High School
Cookie Business - Cookie Creations
More than JUST Cookies!

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Google Slides Link

https://docs.google.com/presentation/d/18-Co1vXGTAamwkRx9vJwMClqMgvluMcs4zrD4bc92G4/edit?usp=sharing
## Control Chocolate Chip Cookie Recipe

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount (grams)</th>
<th>Amount (volume)</th>
<th>Baker’s %</th>
</tr>
</thead>
<tbody>
<tr>
<td>All-purpose flour</td>
<td>317</td>
<td>2 ½ cups</td>
<td>100</td>
</tr>
<tr>
<td>Baking soda</td>
<td></td>
<td>1 tsp.</td>
<td></td>
</tr>
<tr>
<td>Baking powder</td>
<td></td>
<td>1 tsp.</td>
<td></td>
</tr>
<tr>
<td>Salt</td>
<td></td>
<td>1 tsp.</td>
<td></td>
</tr>
<tr>
<td>Unsalted butter, cool room temperature</td>
<td>226</td>
<td>1 cup</td>
<td>71.3</td>
</tr>
<tr>
<td>Granulated sugar</td>
<td>150</td>
<td>¾ cup</td>
<td>47.3</td>
</tr>
<tr>
<td>Brown sugar</td>
<td>150</td>
<td>¾ cup</td>
<td>47.3</td>
</tr>
<tr>
<td>Eggs, cool room temperature</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Vanilla extract</td>
<td></td>
<td>1 tsp.</td>
<td></td>
</tr>
<tr>
<td>Semi-sweet chocolate chips</td>
<td>255</td>
<td>1 ½ cups</td>
<td>80.4</td>
</tr>
</tbody>
</table>
## Cookie Base Recipe

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount (grams)</th>
<th>Amount (volume)</th>
<th>Baker’s %</th>
</tr>
</thead>
<tbody>
<tr>
<td>All-purpose flour</td>
<td>191</td>
<td>1 ½ cups</td>
<td>100</td>
</tr>
<tr>
<td>Baking soda</td>
<td></td>
<td>½ tsp.</td>
<td></td>
</tr>
<tr>
<td>Baking powder</td>
<td></td>
<td>½ tsp.</td>
<td></td>
</tr>
<tr>
<td>Salt</td>
<td></td>
<td>½ tsp.</td>
<td></td>
</tr>
<tr>
<td>Unsalted butter, cool room temperature</td>
<td>113</td>
<td>½ cup</td>
<td>59.2%</td>
</tr>
<tr>
<td>Granulated sugar</td>
<td>150</td>
<td>¾ cup</td>
<td>78.5%</td>
</tr>
<tr>
<td>Egg, cool room temperature</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Extract</td>
<td></td>
<td>½ tsp.</td>
<td></td>
</tr>
<tr>
<td>Mix-in</td>
<td></td>
<td>1 cup</td>
<td></td>
</tr>
</tbody>
</table>
Chewy Cookie

- Use more brown sugar – very hygroscopic (takes in and retains moisture)
  - Keep total amount of sugar the same
  - Dark brown sugar instead of light brown sugar (even more moisture and flavor)
- Add an egg yolk along with the other egg(s) – protein, fat, moisture
  - Can add 1 Tbsp. of flour if you still want a thick cookie
- Substitute some or all of the all-purpose flour with bread flour – depending on how much chew you want
  - Bread = higher protein, so more gluten formation; also absorbs more moisture
- Chill the dough 24-72 hours – allows for absorption
  - Also adds flavor!
Chewy Cookie

• Use melted butter
  • Can add 1-2 T. of flour to reduce spreading and greasiness
  • Butter is 20% water, so melting it helps butter hydrate the flour and form gluten

• Add 1 T. corn syrup
  • After creaming butter and sugars
  • Prevents sugar from crystallizing
Soft Cookies

• Use more brown sugar – hygroscopic
  • Keep total amount of sugar the same

• Add cornstarch – thickening agent, aids in lift and height, dilutes protein
  • Add 1-2 tsp. with the dry ingredients

• Use pastry or cake flour – less gluten provides softness, finer texture
  • Substitute for up to half of the all-purpose flour
  • Cookies will also spread relatively thin so can add slightly more flour or chill the dough balls before baking to prevent too much spreading
Soft Cookies

• Add cream cheese – adds richness and flavor, tenderizes
  • 2-4 oz of room temperature (full fat) cream cheese with butter and sugar, depending on yield of the recipe
  • May need to add 1-4 T. flour to compensate for the added moisture
• Bake at 325°F – less caramelized texture and flavor
Cakey Cookies

• Add cornstarch – thickening agent so adds lift and height, dilutes protein
  • Add 1-2 tsp. with dry ingredients
• Add liquid sweetener – hygroscopic so complete with protein for moisture in dough, slowing gluten development
  • Replace 15-50% of sugar in recipe with liquid sweetener; don’t want too much because don’t have a crystalline structure to hold air when beaten with butter
  • Will need to add more flour (2 T. to ½ cup) to compensate extra moisture
Cakey Cookies

- Add an egg white to the other eggs in the recipe
  - Adds more water content to dough that then evaporates, creating a taller, lighter
- Use pastry or cake flour – less protein so less gluten development
  - substitute up to half of the all-purpose flour
  - Cookies will spread more so can add more flour or chill your dough
Thick and Tall Cookies

- Chill the dough – no more than 72 hours
  - Ensure hydration of dry ingredients to make a firmer dough
  - Will also marinate the flavors
  - Could also refrigerate the balls of dough until chilled, about 30min to an hour before baking
- Scoop tall mounds of dough – take longer to spread in the oven
- Add extra flour – removes moisture in dough
  - 1-4T. Of extra flour
- Use shortening – higher melting point than butter and no water content (takes longer to melt and moistens less)
  - Replace half of the butter with shortening
- Add cornstarch – thickening agent
  - Add 1-2 tsp.
Thin and Crispy Cookie

• Use more granulated sugar – much less hygroscopic than brown sugar and liquid sweeteners so increased spread and crispness
  • Substitute up to ¾ of the total sugar in the recipe or just add additional granulated sugar beyond total amount
  • Be careful to substitute all of the sugar because if there’s baking soda in the recipe, it will need acid from brown sugar or other ingredients to activate
• Add milk – increases moisture which gives more spread
  • 1-2 T. with the eggs and vanilla
• Use less flour – increases moisture content of dough
  • Remove up to 3 T.
Thin and Crispy Cookie

- Use a hot, greased baking pan – more grease and heat allows for more spread
  - Place baking pan in oven for 5 minutes or until hot, then spray with nonstick spray
- Use melted butter – gives warmer dough and becomes more browned and crispy
  - Melt butter before vigorously stirring in sugar
  - Let mixture cool before continuing with the recipe as it says
- Flatten the dough – more likely to spread and flatten during baking
  - Can use palm of your hand or bottom of a measuring cup
Cookie Science Lab Teaching Ideas

- Does each group pick an ingredient variation to try and then all students try each one?
- Does each group want to create their perfect cookie? Turn it into a competition!
- Have students create a 30 second commercial to the class to explain/promote their cookie variation and then taste test.
- Have it as a schoolwide taste test or invite judges to come in to see who has the best cookie.
Home Baking Association: Lab Manual

• Cookie Science Substitution
• Lab 7 – Sweet! Baking Sugars
• pg. 69
Recipe Website Sources: Weight

HANDLE THE HEAT  
BAKER BY NATURE  
SALLY’S BAKING ADDICTION
Competitions
Cupcake Wars Judging Rubric

Team Name: __________________________

Please rate the following groups on a scale of 0 – 5.
0 – N/A or was not visible
1 – Inadequate
2 – Needs improvement
3 – Room for improvement, but adequate
4 – Meets expectations, good job
5 – Exceptional job, exceeds expectations

Display Presentation & Creativity:
0 1 2 3 4 5

Cupcake Appearance:
0 1 2 3 4 5

Cupcake Flavor & Texture:
0 1 2 3 4 5

Filling Flavor & Texture:
0 1 2 3 4 5

Frosting Flavor & Texture:
0 1 2 3 4 5

Total Score: ___________/25

Comments:
<table>
<thead>
<tr>
<th>1 Orange</th>
<th>2 Yellow</th>
<th>3 Aqua</th>
<th>4 Red</th>
<th>5 Green</th>
<th>6 Purple</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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Tic Tac Booyah

- Have a stack of questions for each group – printed off and cut out
- Each group should have a whiteboard and marker
- Give out the first question to each group
- The group needs to put their answer on the whiteboard and bring it up to the teacher to check
- Correct answer – get a new question and mark a square on the board
- Wrong answer – take their whiteboard back to their group to come up with a new answer to get checked
- Tips: have each group go through the questions in the same order to keep things “fair”
- Winner – the group with the most three-in-a-rows (can choose if they need a completely new set or can use squares from another three-in-a-row)
Grudge Ball

Instructions


I use a bucket with a tennis ball and tape two different lines on the floor for different point values.
Teacher Goals

• Student Shout Outs - at least once a week
  o contact home to give a positive shout out about one of your students
• Have a conversation with each student - could be every lab, each week
  o this is more specific than “build relationships”
• Weekly picture/video to show
Contact Information | Questions?

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• (913)484-9854