

# Clean Label for Gluten Free Bakery Products

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# Gluten Free Bakery Products Represent

**In dollars and cents**, sales of gluten-free products were expected to total \$10.5 billion in 2013, according to Mintel, a market research company, which estimates the category will produce more than \$15 billion in annual sales in 2016. [NYT 2014]

Bread products, cookies and snacks have the largest market share at 23.9 percent. [Denise Shoukas Specialty Food Magazine 2014]



# Breads, Cookies, Snacks % Mkt Share

SALES OF GLUTEN-FREE FOODS AND BEVERAGES, BY SEGMENT						
	2011*	Share of	2012*	Share of	2013*	Share of
	\$M	Market %	\$M	Market %	\$M	Market %
Bread products, cookies, snacks	1,430	19.5	1,804	20.5	2,524	23.9
Dairy/dairy alternatives	1,420	19.4	1,950	22.2	2,249	21.3
Beverages	1,664	22.7	1,779	20.2	1,977	18.8
Meats/meat alternatives	659	9.0	763	8.7	868	8.2
Condiments, seasonings, spreads	653	8.9	737	8.4	819	7.8
Desserts & ice cream	685	9.3	726	8.3	791	7.5
Prepared foods	497	6.8	578	6.6	689	6.5
Pasta and rice	118	1.6	149	1.7	188	1.8
Other	210	2.9	306	3.5	441	4.2
<b>Total</b>	<b>7,338</b>	<b>100.0</b>	<b>8,792</b>	<b>100.0</b>	<b>10,544</b>	<b>100.0</b>

\*52 weeks ending June 11, 2011; June 9, 2012; June 8, 2013

Note: Numbers may not equal total due to rounding. Conventional Channel, Natural Supermarket, and Specialty/Gourmet Retailer Sales of Gluten-Free Foods, by Segment, at Current Prices, 2011-2013. Source: Spins/Nielsen/Mintel

[Denise Shoukas Specialty Food Magazine 2014]



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# How Are Gluten Free and Clean Label Linked?

Let's look at some recent data.



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# Reasons I first Started Using Gluten Free Foods

(% total gluten-free Users indicating the reasons why they first started using gluten free foods)


To eat healthier/to improve overall health	51%
I wanted to feel better	38%
To lose weight	27%
I tried a gluten free food by accident and I liked it	24%
To manage a health condition [other than weight]	24%
I wanted to look better	20%
I have gluten/wheat sensitivity or intolerance	16%
They taste better than regular foods	13%
Generally to reduce pain	12%
I have other food allergies	10%
<b>I have celiac disease/was diagnosed with celiac</b>	<b>6%</b>

Steve Williams Vice President, Strategic Consulting

Natural Marketing Institute 2016



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# A predominant trend in gluten-free product development reflects the concerns of the clean eating/clean-label movement:


- Fewer and simpler ingredients.
- Free-from formulations.
- Minimally processed with organic, sustainable production methods.
- Transparency in business practices.

Packaged Facts - A division of Market Research Group, LLC

<http://www.packagedfacts.com/Gluten-Free-Foods-10378213/>.



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Today we will review a few commercial gluten free bakery products and discuss the options to reformulate and/or alter process to make it clean label friendly.



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I will be using the Website

**Gocleanlabel.com**

for clean label guidance.

It is a free online resource.



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# Let's Look at Some Commercial Products

Ready-To-Eat [RTE]  
[including frozen]  
gluten free bakery  
items

1. Breads
2. Cakes
3. Pancakes
4. Cookies

Ready-To-Cook [RTC]  
dry mix gluten free  
bakery items

1. Breads
2. Cakes
3. Pancakes
4. Cookies





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# Ready-to-Eat [R-T-E]



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# Bread



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# Case 6 - White Sandwich Bread

## INGREDIENTS:

Water

Tapioca starch

Brown rice flour

Canola oil

Egg whites

Potato starch

**Modified food starch**

Tapioca maltodextrin

Dried cane syrup

Tapioca syrup

Yeast

Gum (Xanthan, **Sodium alginate**,  
Guar)

Salt

Locust bean gum

Cultured corn syrup solids

Citric acid (Mold inhibitor)

Enzymes .



# Remediation

1. Modified food starch – Not clean label.

Action - Remove and replace with a clean label starch.

2. Sodium alginate – Not clean label (it is a modified ingredient)

Action - Remove and replace with a clean label ingredient.





# Case 7 - Sandwich Bread

## INGREDIENTS:

Water

**Modified tapioca starch**

Corn starch

Potato starch

Canola oil and/or safflower oil  
and/or sunflower oil

Egg whites

Brown rice flour

Tapioca starch

Sugar

Molasses

Salt

Yeast

Xanthan gum

Glucono-delta-lactone

Flax seed

Sunflower seeds

**Sodium bicarbonate**

Caramelized sugar

**Modified cellulose**

**Calcium sulphate**

Enzymes



# Remediation

1. Modified tapioca - Not clean label.

Action - Manufacturer has to verify it's clean label status. If fails, then replace.

2. Sodium bicarbonate – Not clean label.

Action – Remove and replace. The yeast used should be sufficient for leavening.

3. Modified cellulose [could be a chemically modified form such as Sodium carboxymethyl cellulose]

Action – Verify; if fails, then replace.

4. Calcium sulphate – Not clean label.

Action – Replace it – numerous purposes difficult to identify in this case.





# Case 8 - 7 Ancient Grains

## Whole Grain Bread

### INGREDIENTS:

Water

Whole grain brown rice flour

Tapioca starch

Corn starch

Whole grain millet flour

Whole grain sorghum flour

Whole grain teff flour

Egg whites

Corn dextrin

Cane sugar

Canola oil

Potato flour

Honey

Rice bran extract

Sunflower seeds

Sesame seeds

Whole grain quinoa

Whole grain teff

Ground flax seeds

Whole grain millet

Whole grain amaranth flour

Hemp seeds

**Baking powder**

Yeast

Xanthan gum

Salt

Vinegar

Enzymes [**calcium sulfate** & enzymes]



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# Remediation

1. Baking powder – Not clean label.

Action – Remove and replace. The yeast used should be sufficient for leavening.

2. Calcium sulfate – Not clean label.

Action - Replace enzyme blend.



# Case 18 - Light White Sandwich Bread

## INGREDIENTS:

Water

Tapioca starch

Canola oil

Brown rice flour

Potato starch

Maltodextrin (non-allergen derived)

Cage free egg whites (egg whites,  
water, guar gum, sodium citrate,  
triethyl citrate)

Cornstarch

Sugar

Yeast

Oat fiber

Calcium sulfate

Baking powder (sodium acid  
pyrophosphate, sodium  
bicarbonate, cornstarch,  
monocalcium phosphate)

Cellulose (non-allergen derived)

Enzymes

Guar gum

Microcrystalline cellulose

Salt

Citric acid

Ascorbic acid

Vitamin C

Xanthan gum



# Remediation

1. Baking powder – Not clean label.

Action – Remove and replace. The yeast used should be sufficient for leavening.

2. Microcrystalline cellulose & cellulose [could both be a chemically modified form such as sodium carboxymethyl cellulose]

Action – Verify; if fails, then replace.

4. Calcium sulphate – Not clean label

Action – determine purpose & replace it.



# Cake



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# Case 9 - Bundt Cake

## INGREDIENTS:

Gluten free flour (white rice, tapioca)

Sugar

Eggs

Canola oil

Cocoa

Water

Baking powder (sodium acid pyrophosphate, sodium bicarbonate, corn starch, monocalcium phosphate)

Xanthan gum

Coffee

Natural flavors

Icing ingredients: sugar, corn syrup, water, coffee



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# Remediation

1. Baking powder – Not clean label.

Action –

- a. Remove it.
- b. Understand the need for chemical leavening: carbon dioxide for volume or pH control.
  1. If pH control select a clean label friendly acidulate
  2. If cake volume - Then add a high speed mixer to develop the desired volume and have sufficient free water in batter to form steam during baking.
  3. Consider using carbonated water to introduce carbon dioxide.



# Case 15 - Vanilla Confetti Cake

## INGREDIENTS:

Sugar  
rBGH-free butter  
Cage-free eggs  
Rice flour  
Cage-free egg whites (egg whites,  
water, guar gum, sodium citrate,  
triethyl citrate)  
Canola oil  
Water  
rBGH-free milk  
Cage-free egg yolks (yolks, sugar)  
Carnival sprinkles (sugar, cornstarch,  
palm oil & palm kernel oil, dextrin,  
soy lecithin, colored w/ turmeric,  
annatto, vegetable juice and beet  
juice, confectioner's glaze, carnauba  
wax)

Chocolate sprinkles (sugar,  
unsweetened chocolate, cocoa  
butter, dry whole milk, butterfat,  
natural vanilla flavor)  
Potato starch  
Cornstarch  
Tapioca starch  
Baking powder (sodium acid  
pyrophosphate, sodium  
bicarbonate, cornstarch,  
monocalcium phosphate)  
Powdered sugar  
Vanilla  
Salt  
xanthan gum



# Remediation

1. Baking powder – Not clean label.

Action –

- a. Remove it.
- b. Understand the need for chemical leavening: carbon dioxide for volume or pH control.
  1. If pH control select a clean label friendly acidulate.
  2. If cake volume - Then add a high speed mixer to develop the desired volume and have sufficient free water in batter to form steam during baking.
  3. Consider using carbonated water to introduce carbon dioxide.







# Case 25 – Honey loaf

## INGREDIENTS:

Gluten free flour (White Rice, Sorghum, Tapioca)

Eggs

Sugar

Canola oil

Honey

Water

Orange juice

**Baking powder**

Vanilla sugar

Coffee

**Baking soda**

Xanthan gum

Cinnamon



# Remediation

1. Baking powder & baking soda – Not clean label.

Action –

- a. Remove them.
- b. Understand the need for chemical leavening: carbon dioxide for volume or pH control.
  1. If pH control select a clean label friendly acidulate.
  2. If cake volume - Then add a high speed mixer to develop the desired volume and have sufficient free water in batter to form steam during baking.
  3. Consider using carbonated water to introduce carbon dioxide.





# Pancakes



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# Case 16 – Frozen Pancake

## INGREDIENTS:

Water

Gluten free mix (brown rice flour, potato starch, tapioca starch, rice flour, soy flour)

Cane sugar

non-GMO expeller pressed canola oil

Baking powder (sodium acid pyrophosphate, baking soda, rice flour, monocalcium phosphate)

Molasses

Soy lecithin

Guar gum



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# Remediation

1. Baking powder – Not clean label.

Action –

- a. Remove it.
- b. Understand the need for chemical leavening: carbon dioxide for volume or pH control.
  1. If pH control select a clean label friendly acidulate.
  2. If pancake volume - Then add a high speed mixer to develop the desired volume and have sufficient free water in batter to form steam during baking.
  3. Consider using carbonated water to introduce carbon dioxide.
  4. Test batter for proper viscosity with Bostwick consistometer.





# Case 22 - Frozen Pancake

## INGREDIENTS:

Water

Rice flour

Tapioca flour

Sugar

Soy flour

Potato flour

Whole egg powder

Canola oil

Baking powder [sodium pyrophosphate, sodium bicarbonate, tapioca flour, monocalcium phosphate]

Salt

Xanthan gum

Natural flavor



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# Remediation

1. Baking powder – Not clean label.

Action –

- a. Remove it.
- b. Understand the need for chemical leavening: carbon dioxide for volume or pH control.
  1. If pH control select a clean label friendly acidulate.
  2. If pancake volume - Then add a high speed mixer to develop the desired volume and have sufficient free water in batter to form steam during baking.
  3. Consider using carbonated water to introduce carbon dioxide.
  4. Test batter for proper viscosity with Bostwick consistometer.





# Cookies



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# Case 10 - Vanilla Cookies

## INGREDIENTS:

Gluten free flour (corn, tapioca, brown rice, sorghum,)

Sugar

Palm oil

Canola oil

Fresh eggs

Vanilla (pure)

Xanthan gum

Salt



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# Case 11 – Chocolate Chip Cookie

## INGREDIENTS:

Certified gluten free whole grain oats

Semi-sweet chocolate chips (sugar, chocolate liquor, cocoa butter, dextrose, soya lecithin)

Peanut butter (peanuts, salt)

Butter (sweet cream, salt)

Pure cane brown sugar

Pure cane sugar

Eggs

Invert sugar

Water

Baking soda



# Remediation

1. Baking soda – Not clean label.

Action – Remove it and increase mixing during the creaming stage to increase air cell initiation for the last stage gas to fill to increase porosity.



# Case 13 – Sugar Cookie

## INGREDIENTS:

Rice flour

Tapioca starch

Sugar

Butter (cream, salt)

Palm oil

Brown rice flour

Butter toffee bits (sugar, butter (cream, salt), corn syrup, soy lecithin, salt)

Invert sugar

Salt

Soy lecithin

Xanthan gum

**Baking soda**

Note: I do not see water in the ingredient statement [invert sugar has little water]



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# Remediation

1. Baking soda – Not clean label.

Action – Remove it.

- a. Remove baking soda from formula [since there is no added water there would be no chemical activity.]
- b. If there was water added, then increase mixing during the creaming stage would increase air cell initiation for the last stage gas to fill to increase porosity.





# Case 14 – Ginger Cookies

## INGREDIENTS:

Crystalized ginger [ginger, sugar]

Rice flour

Butter

Cane sugar

Brown cane sugar

Eggs

Vanilla extract

Salt

**Baking soda**

Xanthan gum



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# Remediation

1. Baking soda – Not clean label.

Action – Remove it and increase mixing during the creaming stage to increase air cell initiation for the last stage gas to fill to increase porosity.





Ready to Cook [R-T-C]  
Prepared at Home by Consumer



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# Bread Mixes



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# Case 1 - Bread mix

## INGREDIENTS:

Specialty flour blend (rice flour, tapioca starch)

Tapioca starch

Potato starch

Cane sugar

Emulsifier (mono- and diglycerides)

Salt

Xanthan gum

Vitamin and mineral blend [calcium carbonate, niacinamide (vitamin B<sub>3</sub>),  
reduced iron, thiamin hydrochloride (vitamin B<sub>1</sub>), riboflavin (vitamin B<sub>2</sub>)]

Enzymes

Dry yeast

Sorbitan monosterate

Ascorbic acid

Consumer addition: milk, whole Egg, melted Butter or Oil



# Remediation

1. Emulsifier (mono- and diglycerides) - Not clean label.

Action - Replace with hydrated mono- and diglycerides  
[Per David Busken, 2015]



# Case 2 – Whole Grain Bread Mix

## INGREDIENTS:

Whole grain sorghum flour

Potato starch

Cornstarch

Pea protein powder

Tapioca flour

Sugar

Xanthan gum

Sea salt

Guar gum

Yeast

Sorbitan Monostearate

Ascorbic Acid

Consumer addition: Warm Water, whole Egg, melted Butter or Oil



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# Case 3 - Bread Mix

## INGREDIENTS:

Sorghum flour  
Tapioca flour  
White rice flour  
Sweet rice flour  
Brown rice flour  
Evaporated cane sugar  
Inulin  
Millet flour  
Molasses & honey  
Rice bran  
Sea salt  
Xanthan gum  
Yeast

Consumer addition: eggs, 1/3 cup oil, warm water



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# Cake Mixes



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# Case 19 – Yellow cake mix

## INGREDIENTS:

Rice flour

Sugar

Potato starch

Leavening (baking soda, calcium phosphate, sodium aluminum phosphate)

Pea fiber

Cellulose

Tapioca starch

Canola oil

Natural and artificial flavors

Salt

Propylene glycol

Esters of fatty acids

Distilled monoglycerides

Xanthan gum

Cellulose gum

Sodium stearoyl lactylate

Soy lecithin

Whey

Sodium caseinate

Palm kernel oil

Yellow 5

Red 40

Citric acid and BHT [Antioxidants]

Consumer addition: eggs, 1/3 cup oil, water



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# Remediation

1. Baking powder – Not clean label.

Action –

- a. Remove it.

- b. Understand the need for chemical leavening: carbon dioxide for volume or pH control.

2. Cellulose & cellulose gum – Not clean label.

Action – Remove it and replace with a clean label one. They are viscosity building. Utilize the high speed mixing of the oil, water, and egg to develop a foam then fold in the dry mix.

3. Propylene glycol – Not clean label.

Action – Remove it. It helps maintain moisture so select another ingredient.

3. Esters of fatty acids & Distilled monoglycerides & Sodium stearoyl lactylate – Not clean label.

Action – Remove it . They are emulsifiers that provide aeration and foam stabilization. Utilize the high speed mixing of the oil, water, and egg to develop a foam then fold in the dry mix.

4. Yellow 5 & Red 40 – Not clean label.

5. Action – Remove it. Replace with other color.







# Case 20 - Yellow cake mix

## INGREDIENTS:

Rice flour

Sugar

Potato starch

Leavening [baking soda, sodium acid pyrophosphate, mono calcium phosphate]

Xanthan gum

Salt

Consumer addition: eggs, butter, water, vanilla



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# Remediation

## 1. Baking powder – not clean label

### Action –

- a) Remove it
- b) Understand the need for chemical leavening: carbon dioxide for volume or pH control.
- c) Utilize the high speed mixing of the butter, water, and egg to develop a foam then fold in the dry mix.
- d) Consider adding carbonated water.





# Case 21 – Yellow cake

## INGREDIENTS:

Sugar

Potato starch

Tapioca flour

Whole grain sorghum flour

**Baking powder (monocalcium phosphate, bicarbonate of soda, cornstarch)**

Sea salt

Xanthan gum

Vanilla powder (sugar, cornstarch, vanilla extract)

Consumer addition: eggs, 1/3 cup oil, water



# Remediation

1. Baking powder – Not clean label.

Action –

- a) Remove it.
- b) Understand the need for chemical leavening: carbon dioxide for volume or pH control.
- c) Utilize the high speed mixing of the oil, water, and egg to develop a foam then fold in the dry mix.
- d) Consider adding carbonated water.





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# Pancake Mix



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# Case 4 - Pancake Mix

## INGREDIENTS:

Whole grain brown rice flour

Potato starch

Tapioca starch

Rice flour

Cane sugar

Leavener (baking soda, calcium acid pyrophosphate, monocalcium phosphate)

Natural flavors

Salt

Vitamin and mineral blend [calcium carbonate, niacinamide (vitamin B<sub>3</sub>),  
reduced iron, thiamin hydrochloride (vitamin B<sub>1</sub>), riboflavin (vitamin B<sub>2</sub>)]

Xanthan gum

Customer adds: egg, butter, milk



# Remediation

## 1. Baking powder – Not clean label.

Action –

- a) Remove it.
- b) Understand the need for chemical leavening: carbon dioxide for volume or pH control.
- c) Utilize the high speed mixing of the butter, milk, and egg to develop a foam then fold in the dry mix.
- d) Consider beating in melted butter with dry ingredients, then add whisked egg and milk along with the dry ingredients.



# Case 5 - Pancake Mix

## INGREDIENTS:

Whole Grain Brown Rice Flour

Potato Starch

Tapioca Starch

Rice Flour

Sugar

Leavening (Calcium Acid Pyrophosphate, Monocalcium Phosphate, Baking Soda)

Natural Flavor

Salt

Xanthan Gum

Niacinamide (a B Vitamin)

Reduced Iron

Thiamin Hydrochloride (Vitamin B<sub>1</sub>)

Riboflavin (Vitamin B<sub>2</sub>)

Customer adds: milk, water, and egg



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# Remediation

1. Baking powder – Not clean label.

Action –

- a) Remove it.
- b) Understand the need for chemical leavening: carbon dioxide for volume or pH control.
- c) Utilize the high speed mixing of the butter, milk, and egg to develop a foam then fold in the dry mix.
- d) Consider beating in melted butter with dry ingredients, then add whisked egg and milk along with the dry ingredients.



# Case 12 - Pancake Mix

## INGREDIENTS:

Rice flour

Whole grain sorghum flour

Sugar

Brown rice flour (rice flour, stabilized rice bran with germ)

Soybean oil

Dextrose

Leavening (baking soda, sodium aluminum phosphate, monocalcium phosphate)  
food starch-modified

Salt

Tapioca starch

Xanthan gum

Buttermilk

Natural flavors (contains milk derivatives)

Customer adds: water, milk, eggs



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# Remediation

1. Baking powder – Not clean label.

Action –

- a) Remove it.
- b) Understand the need for chemical leavening: carbon dioxide for volume or pH control.
- c) Utilize the high speed mixing of the butter, milk, and egg to develop a foam then fold in the dry mix.
- d) Consider beating in melted butter with dry ingredients, then add whisked egg and milk along with the dry ingredients.





# Cookie Mixes



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# Case 23 - Sugar Cookie Mix

## INGREDIENTS:

Rice flour

Sugar

Potato starch

Leavening (Baking Soda, Sodium Acid Pyrophosphate, Monocalcium Phosphate)

Xanthan gum

Salt

Consumer adds: butter, vanilla, and egg



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# Remediation

1. Baking powder – Not clean label.

Action –

- a. Remove it.
- b. Understand the need for chemical leavening: texture and crumb character are key considerations.
  - 1) Utilize the mixing to cream the butter with the dry ingredients.
  - 2) Whisk the egg to a foam.
  - 3) Combine all ingredients with gentle mixing.





# Case 24 – Sugar Cookie Mix

## INGREDIENTS:

Sugar

Brown rice flour

Tapioca starch

Amaranth flour

Cornstarch

**Baking soda**

Xanthan gum

Flake salt

Customer adds: butter, egg, vanilla.



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# Remediation

1. Baking soda – Not clean label.

Action –

- a. Remove it.
- b. Understand the need for chemical leavening: texture and crumb character are key considerations.
  - 1) Utilize the mixing to cream the butter with the dry ingredients.
  - 2) Whisk the egg to a foam.
  - 3) Combine all ingredients with gentle mixing.





# Quick Overview of Baking Powder and Baking Soda

It was utilized 150 years ago to replace yeast during European periods of poor wheat harvest. Yeast consumes 3% of the wheat carbohydrate in gas generation. This permitted 3% more food.

They have been useful in many food preparations

A clean label scientist must know the art of these chemical leavening systems in order to develop the desired alternative.



# What To Do With Chemical Leavening?

1. Take it out and observe what happens. If the product is identical with and without you are clean label.
2. If the product is now different and the consumers will notice and judge it as unacceptable you have to reformulate and alter the process.



# What Does Chemical Leavening Do?

## Carbon dioxide

Cookie dough gets its acidity from dry ingredients, like brown sugar or natural cocoa powder. The acid and alkali don't truly mix until the butter melts, which means the reaction doesn't really start until you've put the cookies in the oven.

Once they start baking, carbon dioxide begins to filter through the dough, gently expanding any air cells trapped inside and holding the dough aloft. Without pre-existing pockets of air, the carbon dioxide would simply tunnel up and out. When the cookie sets, the carbon dioxide's footprint is preserved in the crumb.



# What Else Does Chemical Leavening Do?

It also raises the dough's pH, and that's a pretty big deal. Creating an alkaline environment slows protein coagulation, which gives the dough more time to spread before the eggs set. This promotes a uniform thickness from edge to center, helping the cookies bake more evenly. Even speeds the Maillard reaction so that deeper flavors and colors develop in a shorter amount of time.





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# Over View of Alternates to Chemical Leavening



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# Clean Label Leaveners

## Air

The most basic leaven is simply the air that is captured in a dough or batter. This air is created and trapped by a number of different processes while the dough is being mixed.

## Flour

Fluff up [sift] your flour before use. Aerated flour will get whatever you're baking off to a much lighter start.





## Beating and creaming

Don't minimize the importance of these steps; give them the time that's required. Electric mixers have greatly simplified the task of beating sugar, butter and eggs into a light and creamy emulsion for cake, or of making egg whites into meringue. When a recipe calls for 10 minutes of beating - Do it!



## Fats

The way you incorporate fat into a dough or batter also increases the amount of air you add. Creaming butter and sugar together incorporates air, both through the action of the beaters, and because jagged sugar crystals "grab" air as they come to the surface. Vegetable oil will produce a heavier product because it just doesn't contain as much air as butter. Also, the water in butter, when heated in the oven, expands and turns to steam; this also helps create a lighter baked good.







## Eggs

Most recipes calling for eggs have them beaten until they're light and lemon-colored; that's the signal that they've incorporated an appropriate amount of air. Egg whites can be beaten until they've ballooned with air and become meringue. And if you beat eggs together with fat (e.g., creaming eggs and butter), you produce an emulsion that can hold more air than either alone.





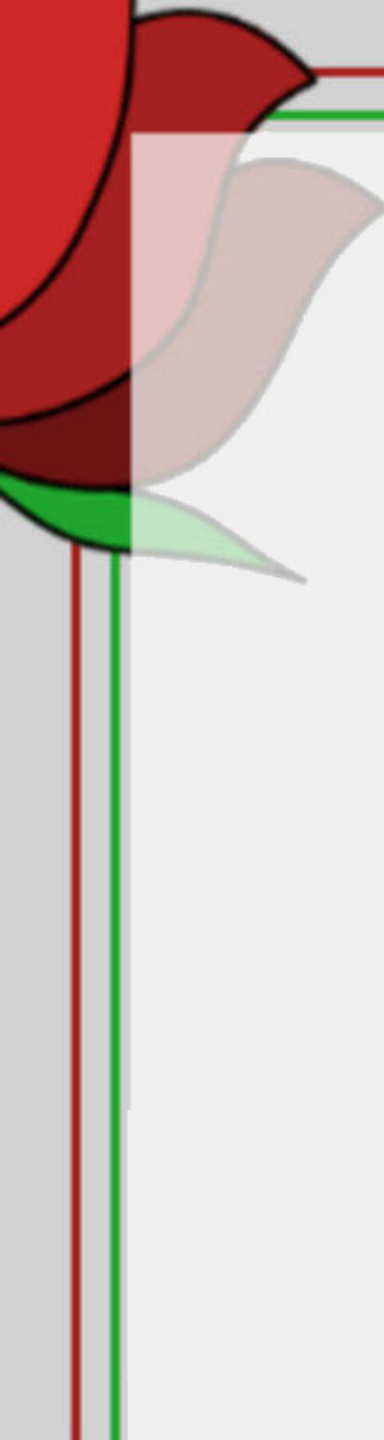
## Liquids

Cool liquids have more air than warm ones. Use cooler (cool tap water, milk from the fridge) rather than warmer, unless directed otherwise.

## Sweeteners

Dry sugars will capture more air in a batter or dough than liquid sweeteners. This isn't to say you shouldn't use honey or molasses or maple syrup; when liquid sweeteners are used, the recipe calls for another type of leavening to raise the batter sufficiently.





Thank You



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