

# Recipies

Brent Seidel  
Phoenix, AZ

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Note that this is a draft version and not the final version for publication.

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# Chapter 1

## Introduction

This is a collection of recipes that I've made and liked. I'm not a particularly skilled baker or cook, so these should be usable by most people. I'm also a bit lazy, so these are mostly fairly easy recipes that will provide good results with minimal effort.

All of these recipes are vegetarian, but may not be vegan. Feel free to adjust them to your needs.

### 1.1 Hints

Here are a few things that I've learned that may be helpful to others.

- All recipes are works in progress. They can always be tweaked a bit. What tastes good to me may not taste good to you (and vice versa). Feel free to adjust things to your taste.
- A set of small (about 1/4 cup size) glass bowls are useful to measure out ingredients before mixing them together.
- A kitchen scale is handy for weighing ingredients.
- In most cases, measurements don't have to be scientifically precise.
- Make sure that you have all the ingredients before starting a recipe.
- If practical, measure out all the ingredients before mixing.
- Many of these recipes are based on ones I found on the internet. In these cases, I've generally adjusted the recipes to be more suitable to what I want. Feel free to do the same.

# Chapter 2

## Breads

Yeast, kneaded breads. There are many ways to make bread. This is only one of them. Feel free to experiment to see if you get results more to your liking.

- Temperature, humidity, and altitude can affect the results.
- Using more water will result in a wetter dough that sticks to your hands more when kneading. It may produce results more to your liking though.
- I don't worry too much about the starting temperature of the ingredients. I figure that by the time everything is mixed and kneaded it's pretty much to ambient temperature.
- When the house is cool, I'll preheat the oven to 100°F and turn it off before putting the dough in the oven to rise.
- When it is dry, I'll keep a little water around to sprinkle on the dough while shaping it.

### 2.1 Basic Bread

This is based on the Sun-dried Tomato Basil bread (section 2.2) with the flavorings removed. This recipe makes one loaf of bread.

#### 2.1.1 Ingredients

- 1 package (1/4 ounce) (8g) active dry yeast
- 3/4 cup (182g) water
- 1 tablespoon (8g) sugar
- 1 tablespoon olive oil
- 1 teaspoon (4g) salt
- 2 cups (350g) bread flour

### 2.1.2 Procedure

- In a large bowl, dissolve yeast in water.
- Stir in sugar, olive oil, and salt. Be sure to add the sugar first and the salt last. Once this is fairly well mixed, move on to the next step.
- Add the flour and mix it in. While adding the flour, you'll probably want to shift from mixing with a spoon to using your hands. The dough doesn't need to be a single lump before moving on. The kneading process will help to merge everything together.
- Turn onto a floured surface; knead until the gluten is well developed, about 5-10 minutes.
- Place in a greased bowl, turning once to grease top.
- Cover and let rise in a warm place until doubled, about 1-2 hour (more if the water was not warm).
- Shape the dough however you like. Note that the dough was greased while rising, so it doesn't need a floured surface to be worked.
- Cover a baking pan with parchment paper, a silicon baking mat, or grease.
- Cover and let rise until doubled, about 1/2 hour.
- Bake at 375°F for 35-40 minutes or until golden brown.
- Remove from pan to a wire rack too cool.

## 2.2 Sun-dried Tomato Basil Braided Bread

I got inspired to make this after watching too many episodes of the Great British Baking Show (aka Great British Bake-off). After finding a suitable bread recipe (yeasted, kneaded), I modified it a bit for my use. Interestingly, on the show, the mix the dry ingredients first before adding liquid while the recipes I found start with the liquid and then add flour. It should work either way, but if you do the dry ingredients first, Paul Hollywood says to make sure to put the yeast on the opposite side of the bowl from the salt.

The quantities of the basil, Parmesan cheese, sun dried tomatoes, and garlic are not critical. Feel free to adjust them to taste. I'm also playing with adding a bit of Feta cheese to see if it helps.

If you are in a hurry, using warm water will make the first rising of the dough faster. Otherwise, using cool water will slow the process, but may improve the flavor.

This recipe makes one loaf of bread.

### 2.2.1 Ingredients

- 1 package (1/4 ounce) (8g) active dry yeast
- 3/4 cup (182g) water
- 1/4 cup (3-6g) minced fresh basil (5-10 leaves)

- 1/4 cup (25g) grated Parmesan cheese
- 1/4 cup (56g) chopped sun dried tomatoes packed in olive oil (if not in oil, add a little bit of oil to the recipe).
- 1 tablespoon (8g) sugar
- 2 crushed cloves of garlic (5g)
- 1 teaspoon (4g) salt
- 2 cups (350g) bread flour

### 2.2.2 Procedure

- In a large bowl, dissolve yeast and sugar in water and let set for a minute or two. You can use this time to prep the next ingredients.
- Stir in basil, Parmesan cheese, sun dried tomatoes, garlic, and salt..
- Add the flour and mix it in. While adding the flour, you'll probably want to shift from mixing with a spoon to using your hands. The dough doesn't need to be a single lump before moving on. The kneading process will help to merge everything together.
- Turn onto a floured surface; knead until smooth and elastic, about 5-10 minutes.
- Place in an oiled bowl, turning once to oil top. Note that the oil is really optional is the dough isn't too sticky.
- Cover and let rise in a warm place until doubled, about 1-2 hour (possibly more if the water was not warm).
- Braid the dough per section 7.4. Note that the dough was greased while rising, so it doesn't need a floured surface to be worked.
- Cover a baking pan with parchment paper, a silicon baking mat, or grease.
- Braid the strands together on the baking pan.
- Cover and let rise until doubled, about 1/2 hour to a full hour.
- Bake at 375°F for 35-40 minutes or until golden brown.
- Remove from pan and place on a wire rack too cool.



## 2.3 Braided Herb Bread

We have a bunch of fresh herbs growing, so I decided to try and make bread with them.

The quantities of the herbs are not critical. I just used how much I was willing to take the time to prepare. If you don't have fresh herbs or the time to prepare them, you can use dried. Feel free to adjust them to taste. It probably needs more than I used here. The next time I try, I will update the recipe.

If you are in a hurry, using warm water will make the first rising of the dough faster. Otherwise, using cool water will slow the process, but may improve the flavor.

This recipe makes one loaf of bread.

### 2.3.1 Ingredients

- 1 package (1/4 ounce) (8g) active dry yeast
- 3/4 cup (182g) water
- 4 g basil (chopped) (about 20 leaves)
- 4 g rosemary
- 3 g oregano (chopped)
- 4 g thyme
- 1/4 cup (25g) grated Parmesan cheese
- 1 tablespoon olive oil
- 1 tablespoon (8g) sugar
- 1 teaspoon (4g) salt
- 2 cups (350g) bread flour

### 2.3.2 Procedure

- In a large bowl, dissolve yeast in water.
- Stir in sugar, herbs, oil, and salt. Be sure to add the sugar first and the salt last. Once this is fairly well mixed, move on to the next step.
- Add the flour and mix it in. While adding the flour, you'll probably want to shift from mixing with a spoon to using your hands. The dough doesn't need to be a single lump before moving on. The kneading process will help to merge everything together.
- Turn onto a floured surface; knead until smooth and elastic, about 5-10 minutes. Note that if dry herbs are used, the dough may be too dry. You can spritz it with a little water while kneading to help, but don't over-do it.
- Place in a greased bowl, turning once to grease top.

- Cover and let rise in a warm place until doubled, about 1-2 hour (more if the water was not warm).
- Braid the dough per section 7.4. Note that the dough was greased while rising, so it doesn't need a floured surface to be worked.
- Cover a baking pan with parchment paper, a silicon baking mat, or grease.
- Braid the strands together on the baking pan.
- Cover and let rise until doubled, about 1/2 hour.
- Bake at 375°F for 35-40 minutes or until golden brown.
- Remove from pan to a wire rack too cool.

## 2.4 Garlic Cheese Rolls

### 2.4.1 Ingredients

- 3/4 cup (182g) water
- 8g active dry yeast
- 8g sugar
- 4g salt
- 350g all purpose flour
- 10g crushed garlic
- shredded cheese

### 2.4.2 Procedure

- In a large bowl, dissolve the yeast in water.
- Add the sugar. You can do these two steps before preparing the rest of the ingredients.
- Add the garlic.
- Add the salt.
- Mix in the flour.
- You can use a dough scraper to cut through the dough multiple times to mix it without kneading.
- You can do a minimal amount of kneading.
- Place the dough back in the bowl and cover to let rise for 1-2 hours.

- Turn the dough out onto the counter top.
- Roll the dough into a rectangular shape a few millimeters thick.
- Spread the shredded cheese on the dough.
- Roll the dough and cheese up like you were making cinnamon rolls.
- Place some parchment paper on a baking pan.
- Slice the roll into 3cm segments and place on baking pan.
- Cover and let rise for another hour or two.
- Bake at 375°F for about 20 minutes or until golden brown.

## Chapter 3

# Pies and Related

### 3.1 Easy Shepherd's Pie/Pot Pie

This is a real easy way to make some comfort food. To make a pot pie, top with a pastry crust instead of mashed potatoes. The measurements are not critical. Feel free to experiment and find something that you like.

#### 3.1.1 Ingredients

- 1 can vegetable soup
- 1 can cream of celery soup
- 1 can cream of potato soup
- 1 can cream of broccoli soup
- 1 can sweet corn
- 1 can green beans
- hot sauce to taste
- 1 packet of instant mashed potatoes

#### 3.1.2 Procedure

- In a large bowl, mix the soups.
- Drain the corn and beans and add them to the mix.
- Add hot sauce to taste.
- Pour the mix into a casserole pan about an inch deep or so.
- In a separate bowl, prepare the instant mashed potatoes per the directions on the packet.

- Spread the mashed potatoes on top of the mixed soups and make a few holes to release steam.
- Bake at 375°F for about an hour, or until the mashed potatoes start browning and the soup mix is bubbling a little.

## 3.2 Quiché

This is more of a concept than a strict recipe. It's very easy to make and can be adjusted to whatever you have on hand or like to have. Feel free to adjust and add whatever sounds good to you.

### 3.2.1 Ingredients

- Tater-Tots<sup>®</sup> (or similar store brand potato puffs)
- A 16oz carton of egg whites
- Shredded cheese
- Chopped olives
- 5 fresh basil leaves
- Turmeric
- Black pepper
- Imitation bacon bits

### 3.2.2 Procedure

- Sparsely cover the bottom of a pie pan with the potato puffs and microwave for a couple of minutes to thaw them.
- Mash them down with a fork to fully cover the bottom.
- Bake for about 20 minutes at 375°F to help dry them out.
- Remove from oven and add the rest of the ingredients.
- Add a layer of shredded cheese to cover the bottom (due to the heat, this will melt a bit).
- Using the chiffonade method (section 7.1), chop the basil leaves and add them.
- Add the chopped black olives and imitation bacon bits (and whatever else you want).
- Add another layer of shredded cheese to fill the pie pan.
- Top with the ground black pepper and turmeric.
- Pour the egg whites over everything (with my pie pan, this fill it right up, you's may vary).
- Bake at 375°F for about 40 minutes. The time isn't particularly critical.

### 3.3 Frittatas

These are basically a quiché muffin. These are easy to make and can be adjusted to your taste. Here's what I've done.

#### 3.3.1 Ingredients

- A 16oz carton of egg whites (or equivalent whole eggs)
- One carrot grated
- Finely chopped broccoli
- Shredded cheese (whatever kind you like)
- A dash of hot sauce
- Seasonings (salt, pepper, turmeric, and/or whatever sounds good)

#### 3.3.2 Procedure

- Grate the carrot into a mixing bowl
- Add a dash of hot sauce
- Add the eggs, broccoli, cheese, seasonings and stir.
- Divide into a non-stick 12 hole muffin pan (You could oil a regular muffin pan or use paper muffin cups).
- Preheat oven to 375°F and bake for about 35 minutes.
- After baking, from oven and let cool before removing from pan.

Note that these can be frozen and reheated later.

# Chapter 4

## Cake and Related

### 4.1 Chocolate Cheesecake Bars

This is based on a recipe that I found on the internet. I've made it once and it turned out quite tasty even though things didn't go quite as I'd hoped. This will probably change a bit if I make it again.

#### 4.1.1 Ingredients

- Shortcrust pastry dough (section 5.1.3).
- Chocolate ganache (section 6.4).
- 8 oz (2 bars) bittersweet chocolate (I use Ghiradelli Premium Baking 60% Cacao bars).
- 24 oz full fat cream cheese
- 1 cup granulated sugar
- 1/4 cup brown sugar (this could probably be just white sugar)
- 2 tbsp unsweetened cocoa powder
- 4 large eggs
- 2 egg yolks
- 1 cup heavy cream
- 2 tsp vanilla extract
- 1 small package of Raspberry jello.

### 4.1.2 Procedure

- Let the cream cheese, eggs, and cream reach room temperature.
- Line a 9x13 inch baking pan with parchment paper. Leave some hanging over on the sides so that you can remove the bars later.
- Make the shortcrust pastry dough and roll it out onto the bottom of the pan.
- Preheat the oven to 350°F and bake the crust for 10 minutes. (I put another sheet of parchment paper over the crust and poured a package of dried beans on top of that).
- Chop the bittersweet chocolate into small chunks and melt (see section 7.3)
- Put the cream cheese into a mixing bowl and, using a mixer, mix until smooth (2 minutes or so).
- Add sugars and cocoa powder and mix until smooth.
- Add eggs, egg yolks and cream and mix for about 20 seconds.
- Fold in the chocolate.
- Add the vanilla and mix for another 20 seconds, or so.
- Using a spatula (and mixer, if needed) stir until everything is evenly mixed.
- Pour the mixture over the crust (I shouldn't have to tell you to remove anything that you placed over the crust).
- Bake for 30 minutes at 350°F. The center should still have a bit of a wobble. It will finish cooking as it cools.
- Remove cake from oven and carefully run a knife around the edge to loosen it from the parchment paper.
- Let cool completely in the pan.
- Mix the small package of raspberry jello and let cool until it starts to thicken (I poured the jello before it has started to thicken and it ran down around the cheese cake and collected mostly on the bottom. It still tasted good, but didn't have the nice layer that I wanted.).
- Pour the jello over the cheesecake and let chill in the refrigerator until completely set (about 4 hours).
- Once set, add the chocolate ganache on top.
- Once the ganache sets, you can slice it and serve it. It can also be frozen.



# Chapter 5

## Pastries

### 5.1 Choux Pastry

This is the recipe for Choux pastry that can then be used for a number of things. As such, this will end once you have the dough made. Other recipes will tell you what to do with the dough and how to bake it. If you are making a sweet pastry and have a bit of a sweet tooth, you can add some sugar along with the salt.

This pastry has a bit of a reputation for being fiddly, but as I was looking online I found a bit of variation. So it's probably more robust that it's given credit for. On the other hand, there is some disagreement about why after mixing the flour with the water and fat it's heated again. Some say that's to dry the dough out, others say that there's a reaction that binds the fat and water around each individual particle of flour and water. My suspicion is more towards the later.

#### 5.1.1 Ingredients

- 1 cup (228g) water
- 6 tablespoons (81g) butter or margarine
- 1/4 teaspoon (2g) salt
- 1 cup (175g) flour
- 4 large eggs

#### 5.1.2 Procedure

- Cut the butter or margarine into small chunks and add to the water.
- Add the salt.
- Bring the water to a boil.
- Once the water is boiling and all the butter or margarine is melted, remove from heat.

- Add the flour while mixing and ensure that there are no lumps
- Return to heat and cook until the dough pulls away cleanly from the sides of the saucepan.
- Let the dough cool enough so that it won't cook the eggs when you add them (about 150°F or so).
- Break and whisk the eggs into a separate container.
- Add the egg a bit at a time while mixing the dough. After you add some egg, the dough becomes a lumpy, slimy mess, but it will eventually mix into a smooth dough again. If you are mixing by hand, don't get discouraged. Keep mixing and it will eventually be right.
- Stop when the dough is smooth and glossy.

The dough is now ready for other projects such as eclairs, profiteroles, cream puffs, and the like.

### 5.1.3 Shortcrust Pastry

This is a basic 3 ingredient dough. I'm not entirely happy with it yet and the dough turns out to be fairly crumbly. This may be because I'm using margarine rather than butter. It may also need a bit more water (I live in a dry climate).

### 5.1.4 Ingredients

- 225g all purpose flour
- 100g (one stick) margarine sliced into small pieces
- a pinch of salt
- 2-3 tbsp water

### 5.1.5 Procedure

- Put the flour and margarine pieces in a large bowl. Rub the flour and margarine together with your fingers until the mixture resembles fine breadcrumbs.
- Add a pinch of salt and mix in.
- Add the water and mix to form a firm dough.
- Knead gently and briefly on a floured surface.
- Wrap in plastic wrap and refrigerate while you do other preparations.
- Roll out and add to pan.

If you are blind baking, bake at 375°F for 10 minutes or so will work.

## 5.2 Eclairs

### 5.2.1 Ingredients

- Choux pastry dough (see section 5.1)
- Stuff for filling
- Stuff for topping

### 5.2.2 Procedure

- Place a sheet of parchment paper on a baking tray
- Pipe the Choux pastry dough into lines on the paper.
- Bake at about 375°F for 35-45 minutes.
- Don't open the oven to check for the first 30 minutes.
- After 30 minutes in the oven, prick a small hole in the shells to let the steam out.
- Remove from the oven when done and let cool.
- Using the hole pricked, you can pipe the filling (such as the Chocolate Mousse in section 6.1) into the eclair.
- Add whatever topping you wish (such as the Chocolate Ganache in section 6.4).

## 5.3 Deep Fried Raspberry-Chocolate Wraps

I got the idea for these one day as I was eating some raspberries with a bag of chocolate chips nearby. This recipe makes one wrap. Scale up as needed.

### 5.3.1 Ingredients

- 3 Raspberries
- 3 Chocolate chips
- 1 Won-ton wrap
- A small amount of egg white (to seal the wraps)
- Powdered sugar

### 5.3.2 Procedure

- Insert the chocolate chips into the raspberries.
- Line the three stuffed raspberries diagonally on the won-ton wrap.
- Roll up the won-ton wrap like a spring roll or a burrito and used a dab of egg white to seal.
- Deep fry at about  $350^{\circ}$  until golden brown.
- Drain and sprinkle with powdered sugar.

Warning: The contents will be hot. Let cool a little before eating.

# Chapter 6

## Extras

These are things that can be used as topping, fillings, or sauces with other recipes.

### 6.1 Coconut Cream Chocolate Mousse

I went looking for chocolate mousse recipes and they all had raw eggs in them. Personally, I don't like to use raw eggs, so I went looking for a vegan recipe. There is a slight hint of coconut flavor in the finished product. Depending on how you feel about this, it may be a good or a bad thing. You could add more cocoa powder or a drop of vanilla extract (or something else) to help hide the flavor. As an alternative, you can try the Tofu Chocolate Mousse (section 6.2).

#### 6.1.1 Ingredients

- 1 can full fat coconut milk. Refrigerate over night so that you can separate the cream (I measured 239g). If you have a can of coconut cream, you can just use that directly.
- 3 tbsp (12g) cocoa powder
- 2 tbsp (18g) sugar

#### 6.1.2 Procedure

- Transfer the coconut cream to a bowl and beat until smooth.
- Beat in the cocoa powder and sugar.
- Continue to beat until it forms a mousse like texture. You should probably pause occasionally to scrape down the sides of the bowl.

### 6.2 Tofu Chocolate Mousse

Here's an alternative to the Coconut Cream Chocolate Mousse (section 6.1) that uses tofu. If you don't like the faint taste of coconut, you can try this one.

### 6.2.1 Ingredients

- 1 block of silken tofu - drained (about 454g).
- 1/4 cup (20g) cocoa powder
- 3 tbsp (27g) sugar

### 6.2.2 Procedure

- Start beating the tofu so that the block is broken up.
- Beat in the sugar and cocoa powder.
- Continue to beat until it forms a smooth mousse like texture. You should probably pause occasionally to scrape down the sides of the bowl.

## 6.3 Tofu Raspberry Mousse

This is basically the same as the Tofu Chocolate Mousse (section 6.2) except that it replaces chocolate with raspberry powder. If you don't like the faint taste of coconut, you can try this one.

### 6.3.1 Ingredients

- 1 block of silken tofu - drained (about 454g).
- 4 tbsp (24g) raspberry powder
- 2 tbsp (21g) sugar

### 6.3.2 Procedure

- Start beating the tofu so that the block is broken up.
- Beat in the sugar and raspberry powder.
- Continue to beat until it forms a smooth mousse like texture. You should probably pause occasionally to scrape down the sides of the bowl.

Feel free to throw in some fresh raspberries or raspberry preserves. The color from just using the raspberry powder is rather pale. Perhaps some food coloring would help.

## 6.4 Chocolate Ganache

### 6.4.1 Ingredients

- 2 bars good quality baking chocolate (225g)
- 1 cup heavy or whipping cream

### 6.4.2 Procedure

- Chop up the chocolate into small pieces. I used a fine grater, but ran into trouble with static electricity flinging pieces around (see Section 7.2).
- Put the chocolate pieces into a heatproof container.
- Heat the cream to a simmer. Don't let it get to a full boil.
- Pour the heated cream over the chocolate pieces.
- Wait for a minute or so to let the chocolate to start melting. Smaller pieces will melt faster.
- Mix until all the chocolate is melted and the mixture is uniform.
- Let cool for use.

## 6.5 Carmel/Spun Sugar

This is a bit fiddly. The first time I tried it, it wound up crystalizing instead of caramelizing. Don't give up, try again. To clean up, fill the pan with water and heat while stirring. This will help dissolve the remaining sugar.

It might be a wise idea to have a large container, such as the kitchen sink, full of cool water just in case of burns from hot sugar.

### 6.5.1 Discussion

This process lies at the intersection of chemistry and physics. There is still disagreement about whether sugar melts or decomposes (see <https://pubs.acs.org/doi/10.1021/jf3002526> for an example). For our purposes, we will assume that it melts at 185°C. This is quite a bit hotter than boiling water (100°C), so caution is advised to avoid burns.

Sugar naturally forms a crystalline solid. This process attempts to make it into an amorphous solid. It can be done, but is a bit tricky. The basic process is to dissolve the sugar in water, boil the water off, then let the sugar heat until it caramelizes (this apparently can be done dry without any water, but is also tricky). As the water boils off, this becomes a super-saturated solution. Given the slightest provocation, it will form crystals. Crystallization can be reduced by keeping the pot clean and making sure that no sugar crystals are present. One can also add a little glucose or fructose to help break up the crystal structure.

Once the sugar is all dissolved, bring the mixture to a boil to get rid of the water. Keep the pastry brush and water handy to keep the sides of the pan clean. You can note a change in the boiling once the water is all gone. At this point, the temperature can rise past the boiling point of water. This is necessary for the caramelizing process. If you just want a sugar syrup, you can quit at this point.

### 6.5.2 Ingredients

- 1/2 cup (105g) granulated sugar
- 2 tablespoons water

Have another container of water handy and a pastry brush.

### 6.5.3 Procedure

If you want spun sugar, be sure to cover the working area with newspapers or something to catch errant globs of sugar.

- Combine the sugar and water in a clean saucepan (I've heard that non-stick ones don't work, but haven't tried myself).
- Gently heat while stirring until all the sugar is dissolved.
- Turn the heat up and let boil undisturbed until the caramel starts to brown. I was able to start smelling caramel at this point. While boiling, use the pastry brush to dab water on any sugar crystalizing on the edges of the pan.
- Remove from heat and let cool a bit.
- If all you want are caramel shards, you can pour out onto something flexible and non-stick to let cool.
- If you want spun sugar, wait until thin strands of sugar come off your fork or whisk when you dip it in the cooling mix.
- Dip your mixer in the sugar mix and whip it back and forth rapidly over the area you want the spun sugar.
- After you've accumulated enough, you can pick it up and gently shape it.



## Chapter 7

# Tips and Techniques

### 7.1 Chiffonade

This is a procedure for thinly slicing herb or vegetable leaves.

#### 7.1.1 Procedure

- After washing and drying the leaves, stack them.
- Tightly roll the stack of leaves.
- Carefully slice off narrow strips perpendicular to the roll (watch your fingers).

After slicing, you can crosscut the thin strips to make smaller pieces. This works well with basil.

### 7.2 Grating Baker's Chocolate

I decided to try grating the chocolate the first time I made a chocolate ganache. The ganache turned out quite good, but it's not clear that grating the chocolate was necessary. My advice is that if you can avoid grating chocolate, do it. If you must, here are some things I learned from experience.

- Keep the chocolate and tools cool or cold. The chocolate will melt in your hand.
- The grated bits of chocolate pick up a static charge and will fly off in unexpected directions. Using a deep bowl rather than a plate will help to contain them.
- Be patient. It may take a long time to get enough chocolate grated.
- The little bits of chocolate will get all over the place. Be prepared to do some cleanup afterwards.

## 7.3 Melting Chocolate

Chocolate melts at a fairly low temperature. The main concerns are to avoid overheating and contact with water. Here are some methods:

### 7.3.1 Microwaving

- Break the chocolate into small chunks and place in a microwave-safe bowl
- Microwave on high for a few (10-15) seconds and check.
- Repeat microwaving for a few seconds and checking until the chocolate is melted.

### 7.3.2 Water Heating

- Fill a saucepan about 1/3 of the way with water.
- Break the chocolate into small chunks and place in a heat resistant bowl. (Note that the bowl needs to be enough bigger than the saucepan that the bottom doesn't touch the water when placed in the saucepan.)
- Put the saucepan on the stove and set the burner as low as it will go.
- Place the bowl in the saucepan and wait until the chocolate starts to melt.
- Stir occasionally until the chocolate is fully melted.

### 7.3.3 Stove Top

If you are brave, careful, foolish, or some combination, you can try just melting the chocolate on the stovetop. This may work best with an electric stove.

- Turn the burner on low.
- Break the chocolate into small chunks and place in a saucepan.
- Once the burner has reached temperature, turn it off.
- Place the saucepan on the burner.
- Stir occasionally until the chocolate is fully melted.
- If the burner cools too much before the chocolate is fully melted, remove the saucepan, heat the burner, turn it off, and replace the saucepan.

## 7.4 Braids

Braids can help things look fancier. A braided loaf of bread looks much fancier than just a plain loaf. As I was looking into various braids, I discovered that there is a branch of mathematics dedicated to braids called braid theory. It seems to be related to knot theory. I will try to restrain my digressions, but if you're interested, there is lots of material on the web for further research.

First, some notation. For each strand  $i$ , two operators are defined. The  $\sigma_i^{-1}$  operation moves strand  $i$  over strand  $i + 1$ . The  $\sigma_i$  operation moves strand  $i$  under strand  $i + 1$ . If you have  $n$  strands, then the operators are not defined for  $i = n$ , since there is no strand  $n + 1$ .

To be a little more concrete, assume that there are three strands so,  $n = 3$ , and that the strands are laid horizontally with strand 1 at the top. To make a normal three strand braid, you first move strand 1 over strand 2. Then you move strand 3 over strand 2. And repeat these two steps until you are finished. The first move is just  $\sigma_1^{-1}$ . The second move has to be expressed as  $\sigma_2$ . This moves strand 2 under strand 3, which is the same thing as moving strand 3 over strand 2. For 3 strands, the notation  $\sigma_3$  is meaningless since it would move strand 3 under strand 4 and there is no strand 4. So the notation for a normal 3 strand braid is  $\sigma_1^{-1}\sigma_2$ , repeated until finished.

When you have many strands, sometimes multiple moves will happen at approximately the same place. I am using the notation  $[\sigma_i, \sigma_j]$ , where  $|i - j| > 2$ , to indicate this.

### 7.4.1 One Strand

This is the basic loaf. Included only for completeness. I suppose I could have also included zero strands, but that just takes nothing and produces nothing.

### 7.4.2 Two Strands

This is really a simple twist (see figure 7.1).

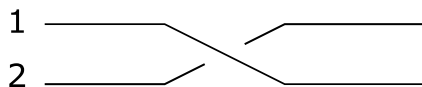


Figure 7.1: Two Strand Braid, Strand 1 Over Strand 2 ( $\sigma_1^{-1}$ )

#### Procedure

- Divide the dough into two equal lumps.
- Roll each lump into long strand.
- Lay the strands side-by-side and squeeze one end together.
- Move the first strand over the second strand ( $\sigma_1^{-1}$ ).
- Repeat ( $\sigma_1^{-1}$ ) until the end of the strands is reached.
- Squeeze the last end together.

### 7.4.3 Three Strands

This is what most people think of when they think of a braid. This is the typical three strand braid (see figure 7.2).

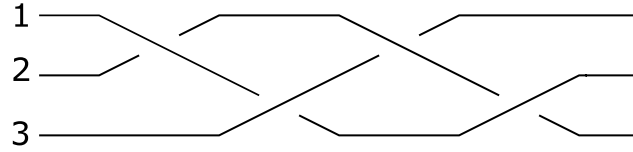


Figure 7.2: Three Strand Braid,  $(\sigma_1^{-1}\sigma_2)$  Repeated

#### Procedure

- Divide the dough into three equal lumps.
- Roll each lump into long strand.
- Lay the strands side-by-side and squeeze one end together.
- Move the first strand over the second strand ( $\sigma_1^{-1}$ ), then move the third strand over the second strand ( $\sigma_2$ ).
- Repeat  $(\sigma_1^{-1}\sigma_2)$  until the end of the strands is reached.
- Squeeze the last end together.

### 7.4.4 Four Strands

There are probably multiple ways to do four or more strand braids. I'm just listing the ones that I've used.

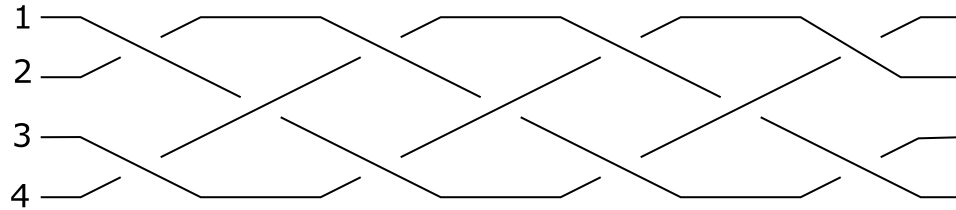


Figure 7.3: Four Strand Braid,  $([\sigma_1^{-1}\sigma_3^{-1}]\sigma_2)$  Repeated

#### Procedure

- Divide the dough into four equal lumps.
- Roll each lump into long strand.

- Lay the strands side-by-side and squeeze one end together.
- Move the first strand over the second strand and the third strand over the fourth strand ( $[\sigma_1^{-1}\sigma_3^{-1}]$ ).
- Then move the second strand under the third strand ( $\sigma_2$ ).
- Squeeze the last end together.

#### 7.4.5 Five Strands

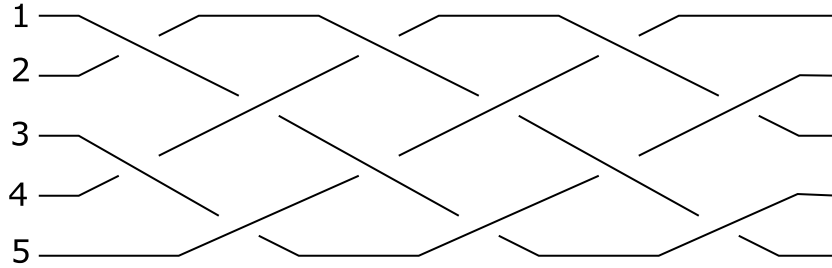


Figure 7.4: Five Strand Braid,  $([\sigma_1^{-1}\sigma_3^{-1}][\sigma_2\sigma_4])$  Repeated

#### Procedure

- Divide the dough into five equal lumps.
- Roll each lump into long strand.
- Lay the strands side-by-side and squeeze one end together.
- Move the first strand over the second strand and third strand over the fourth strand ( $[\sigma_1^{-1}\sigma_3^{-1}]$ ).
- Move the second strand under the third strand and the fourth strand under the fifth strand ( $[\sigma_2\sigma_4]$ ).
- Repeat  $([\sigma_1^{-1}\sigma_3^{-1}][\sigma_2\sigma_4])$  until the end of the strands is reached.
- Squeeze the last end together.