

## **Brownies**

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### **Introduction:**

Brownies are one of the easiest and most delicious desserts to make. With the typical ingredients being white granulated sugar, all-purpose flour, eggs, and butter, there is a lot of science behind this recipe. My great-grandpa Emil used to own a bakery in New York City, so my family has always loved baking. We would often make brownies for events and family dinners, with the recipe easily adapted to adhere to pareve (regarding Kosher laws) or other dietary restrictions. However, how I see it is that since brownies were an integral part of my great-grandpa's bakery, I see it as part of my family since he managed to escape the Holocaust and spread their Jewish foods (not brownies but others) to the people of New York City.

### **History:**

The brownie is often attributed to The Palmer House, a Hilton-owned hotel in Chicago in 1893. The hotel still serves these brownies with the same recipe used back in 1893. American socialite Bertha Palmer, Head of the Board of Lady Managers for the 1893 World's Columbian Exposition, directed Palmer House pastry chefs to come up with a recipe for a dessert that would be easy to transport in boxes to the Women's Pavilion. Brownies would not appear in American cookbooks until a few years later, however, you can still find these original brownies sold at the Palmer House today.

### **Recipe:**

#### **Ingredients:**

- 2 cups white granulated sugar
- 1 cup unsalted butter
- 4 squares unsweetened chocolate (we recommend using baker's chocolate)

- 1 cup all-purpose flour
- 3 teaspoons vanilla extract
- Baking spray (optional)
- Caramel (optional, typically about 1 piece per brownie, my family recommends using Cadbury Milk Chocolate caramel bars)
- 4 eggs

### **Directions:**

- Beat eggs and sugar until thick and light
- Melt butter and chocolate together
- Cool
- Add to egg mixture
- Mix in flour
- Pour into 12 x 8-inch baking pan for 35-45 minutes at 350 degrees Fahrenheit that has been greased and floured
- Cut into 24 pieces and serve while warm

### **Science:**

We melt the butter and whisk the egg which represents the substance being made into a different form and therefore that is a physical change. However, when we bake the brownies, the ingredients mixed undergo a chemical change since they are being made into a new substance. Here is the science behind each specific ingredient:

- **All-Purpose Flour:** All-purpose flour contains a lower protein content (around 10%) than bread flour and works well in most recipes. Primarily made from wheat, gluten will form protein molecules glutenin and gliadin come together and form a bond. When moistened, these two proteins mesh together and become an elastic membrane, trapping carbon dioxide and adding volume and texture to our brownies.
- **Granulated White Sugar:** For this recipe, we use sucrose, also known as table sugar. Sugar is a compound since it is made up of two or more elements that have been chemically combined. Sucrose is soluble in water, so it has a polar covalent bond. Believe it or not, most sugars are actually carbohydrates called saccharides. Sucrose is a disaccharide that consists of molecules that can be hydrolyzed into two monosaccharide units. These are simple sugars that give food a sweet taste, hence why they are being used in our brownies. Sugar helps give the brownies structure as well as they compete with the all-purpose flour to absorb the liquids such as butter.

- Egg: Eggs are an essential part of making brownies. Within the batter, the eggs add stability and structure. In addition, they also add moisture to the brownies which leads to better texture in the final product. If we do not add eggs to our recipe then the brownies will become thinner and will not rise appropriately when in the oven. Eggs are a common ingredient in almost all brownie recipes because eggs play an important role in the taste and outcome of any brownie.
- Unsalted Butter: Contrary to Regina George's burning question in *Mean Girls*, butter is not a carb. Butter is a fat which is one of the four main molecules that most of our foods come from. Fats and oils are part of lipids. When making this recipe pareve, canola oil and cocoa powder are used instead of butter. Fats are solid at room temperature such as butter which has to normally be melted with the dark chocolate whereas oils are liquid at room temperature in this case where they are mixed in with cocoa powder. Fats and oils provide flavor, tenderize many foods, and allow us to heat foods well. Fats and oils have a long hydrophobic chain which makes them insoluble in water. In terms of baking, fats such as butter provide richness, moistness, and help supplement the brownies. The fats and emulsifiers found in the egg yolk help to enrich and moisten the brownie.
- Caramel: Caramel can be made using a simple ingredient: sugar. Although in many cases other ingredients are used as well such as water, cream, butter, or salt. There are two methods: dry and wet. It is made by heating the sugar until the sugar turns into a golden brown. This process is called caramelization, which is a complex chemical reaction where the chemical compounds of the sugar break down by the heat. The sticky and sweet treat can be added onto ice cream as a sauce, or in our case brownies to add a special flavor to them. If a person likes the mix of sweet and savory, adding salt to the caramel could give one the right mix in every bite.

### **Sources:**

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