

5.6: Sodium Bicarbonate

When sodium bicarbonate (baking soda) is moistened and heated, it releases carbon dioxide gas. If it is moistened and heated in the presence of sufficient acid, it will release twice as much gas as if it is moistened and heated without the presence of an acid.

Slightly acidic ingredients provide the mix with some of the necessary acids for the release of carbon dioxide gas. Examples are:

Honey Molasses Ginger Cocoa Bran

For this reason, some of the mixes contain baking powder only while others contain a combination of baking powder and baking soda. If an excessive amount of baking soda is used in a cake batter without the presence of sufficient acid, the normally white cake crumb will have a yellowish-brown color and a strong undesirable smell of soda.

The gas evolves very fast at the beginning of baking when the pH level is still on the acidic side (pH of around 5 to 6). Once the soda neutralizes the acid, the dough or batter quickly becomes alkaline and the release of gas is reduced. Mixes and doughs leavened with baking soda must be handled without delay, or the release of the gas may be almost exhausted before the product reaches the oven.

The darker color of the crumb found on the bottom half of a cake or muffins is caused by the partial dehydration of the batter that is heated first during baking. In spiced honey cookies and gingerbread, baking soda is used alone to give them quick color during baking and yet keep the products soft.

In chocolate cakes, baking soda is used in conjunction with baking powder to keep the pH at a desirable level. However, it is important to know whether the cocoa powder you are using is natural or treated by the Dutch process. In the Dutch process, some of the acid in the cocoa is already neutralized, and there is less left for the release of gas in the mix. This means more baking powder and less baking soda is used.

Baking soda in a chocolate mix not only counteracts the acid content in the baked cake but also improves the grain and color of the cake. A darker and richer chocolate color is produced if the acid level is sufficient to release all the carbon dioxide gas. On the other hand, the reddish, coarse, open-grained crumb in devil's food cake is the result of using baking soda as the principal leavening agent.

The level of baking soda depends on the nature of the product and on the other ingredients in the formula. Cookies, for example, with high levels of fat and sugar, do not require much, if any, leavening.

Table 1 provides the recommended amounts of baking soda for different products. Note that the percentages appear small compared to the 5% level of baking powder suggested because baking powder contains both an acid agent and a leavening agent.

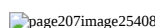
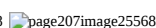
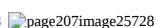
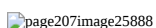
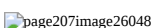
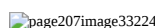
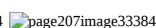
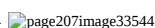
    

Table 1 Recommended amounts of baking soda	
Product	Amount of Baking Soda (% of flour weight)
Cookies	0.4-0.6

Cakes	0.5-1.0
Cake doughnuts	0.7-1.0
Pancakes	1.4-2.0

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