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## Teacher Notes

# Bathing and bubbling with chemistry

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Useful information and applications, as well as some interesting experiments on acid-base chemistry can be found at the Internet:

(The web addresses were accessed on 15 March 2008):

## 1) How to make bath bombs

<http://www.ncf.carleton.ca/~aj471/BathBombs.html>

## 2) Baking powder and baking soda (bicarbonate)

Both baking powder and baking soda are chemical leavening agents that cause batters to rise when baked. The leavener enlarges the bubbles which are already present in the batter produced through *creaming* of ingredients. When a recipe contains baking powder and baking soda, the baking powder does most of the leavening. The baking soda is added to neutralize the acids in the recipe plus to add tenderness and some leavening.

When using baking powder or baking soda in a recipe, make sure to *sift* or whisk with the other dry ingredients before adding to the batter to ensure uniformity. Otherwise the baked good can have large holes.

Baking powder consists of baking soda, one or more acid salts (cream of tartar and sodium aluminum sulfate) plus cornstarch to absorb any moisture so a reaction does not take place until a liquid is added to the batter. Most baking powder used today is double-acting which means it reacts to liquid and heat and happens in two stages. The first reaction takes place when you add the baking powder to the batter and it is moistened. One of the acid salts reacts with the baking soda and produces carbon dioxide gas. The second reaction takes place when the batter is placed in the oven. The gas cells expand causing the batter to rise.

Because of the two stages, baking of the batter can be delayed for about 15-20 minutes

without it losing its leavening power

<http://www.joyofbaking.com/other/glossaryQ-Z.html#sift%20or%20sifting>

## 2) Antacid medical tablets



Antacids perform a neutralization reaction, i.e. they buffer gastric acid, raising the pH to reduce acidity in the stomach. When gastric hydrochloric acid reaches the nerves in the gastrointestinal mucosa, they signal pain to the central nervous system. This happens when these nerves are exposed, as in peptic ulcers. The gastric acid may also reach ulcers in the esophagus or the duodenum.

Other mechanisms may contribute, such as the effect of aluminum ions inhibiting smooth muscle cell contraction and delaying gastric emptying.

Antacids are taken by mouth to relieve heartburn, the major symptom of gastroesophageal reflux disease, or acid indigestion. Treatment with antacids alone is symptomatic and only justified for minor symptoms.

The utility of many combinations of antacids is not clear, although the combination of magnesium and aluminum salts may prevent alteration of bowel habits.

<http://en.wikipedia.org/wiki/Antacid>

#### 4) Aspirin Tummy Test

In this experiment aspirin (a common medicine) is considered as a chemical substance, acetylsalicylic acid. Being an acid it can cause stomach discomfort in some people. One way to lessen this is to combine the aspirin with an acid buffer — a combination of chemicals that reduces acidity. But for people who have take aspirin every day (like blood circulation problems or arthritis sufferers), this is not good enough. For them, chemists invented specially coated aspirin tablets that pass through the stomach without dissolving. The coating resists the acid juices of the stomach, but dissolves quickly in the basic environment of the small intestine. Called “enteric” aspirin, they obviously take a bit longer to work.

In this experiment students simulate a stomach to observe the chemistry of aspirin there. The difference between regular aspirin, buffered aspirin, and enteric aspirin is examined. Another interesting aspirin chemistry note is that as acetylsalicylic acid ages, it can decompose to salicylic acid and acetic acid. If there is a very old packet or bottle of aspirin in the house, and we open it and take a whiff, it might smell like vinegar, which is dilute acetic acid. This is one reason why there are expiration dates!

<http://membership.acs.org/c/chicago/ChmShort/CS05.html>