Pineapple Enzyme

Many people love gelatin-based desserts. Many of us love pineapples too. Should you put them together? As many a gelatin-loving cook has discovered, certain fruits can change gelatin's ability to set. In this experiment, you'll discover what happens when gelatin meets pineapple.

Problem:

What happens to the gelatin when pineapple and gelatin meet?

Materials:

- Fresh pineapple
- 2 bowls
- Measuring cup
- Kettle
- Water
- Spoon
- Two quarters
- 2 containers of gelatin

Procedure:

1. Mix the gelatin powder with warm or hot water according to the package's instructions.
2. Pour an equal amount of gelatin into each of the two bowls.
3. Add ten small chunks of fresh pineapple to one bowl. Keep the other bowl plain.
4. Put both bowls of gelatin in the refrigerator to set, and wait for several hours. Create a hypothesis, your best guess about what is going to happen. Do you think that the presence of pineapple will change the way the gelatin sets? Why?
5. After three or four hours, take the gelatin out of the fridge. What happened to it?
6. Compare the two bowls of gelatin. Place a quarter on top of each bowl, and wiggle the bowls. What happens to the quarter?

Results:

The gelatin with the pineapple in it gets very watery, while the gelatin in the other bowl ends gets firm. A quarter will sink into the liquid in the pineapple gelatin, but it will sit on top of the gelatin in the plain gelatin bowl.

Why?

Pineapples are intriguing plants. Contrary to what you might think, they don't actually grow on a pineapple trees! Pineapples come from pineapple plants, which are bromeliads: spiky plants that grow on the ground.

Pineapples contain the protein-digesting enzyme called bromelain. Bromelain is also used as a meat tenderizer. In fact, some people are very sensitive to the enzyme and find that it makes their lips and tongue sore. This is because the bromelain is working to tenderize your tongue! Don't worry—once it gets to your stomach, there shouldn't be much of a problem.

Gelatin is made out of animal proteins, particularly collagen. When you add water to the gelatin, long chains of protein form, making an invisible protein "spaghetti". Water gets trapped in the middle of these long chains, turning what should be a liquid into a semi-solid.

Since pineapple bromelain digests proteins, when the pineapple meets the gelatin, it begins to eat away at it. The long protein chains collapse, making everything watery again.

Try adding papaya, kiwi fruit, or figs to gelatin. Do you end up with the same problem? Here's a hint: These plants also contain protein-digesting enzymes!