Pectin solutions form gels when an acid and sugar are added. The acid will reduce the pH of the solution and cause the carbohydrate molecules to form junctions. From these junctions a network of polymer chains can entrap an aqueous solution. The sugar increases junction formation. The pectin makes the gel, and the low pH and the amount of soluble solids adjusts the rigidity. The optimum conditions for jelly strength are 1% pectin, a pH of 3.2, and a sugar concentration of 55% (by weight).

Activity Objective

To observe how pectin can be used to form a gel and the effects of too little and too much sugar on gelling.

Materials Required

Sure-Jell ®
Concentrated fruit juice (apple, grape), if frozen, thawed
Granulated sugar
Water
600-milliliter beakers
Bunsen burner with stand or hot plate
Heatproof gloves
Balance or scale
Graduated cylinder
Heatproof pad
Stirring rod/spoon/wooden *Popsicle* stick

Experimental Procedure

Part 1

1. Measure out 53 grams (1/4 cup) of sugar.
2. Put 18 milliliters (0.75 fluid ounce) of fruit juice concentrate, 60 milliliters (1/4 cup) of water, and 7 grams (3 teaspoons) of *Sure-Jell* into a 600-milliliter beaker.
3. Place the beaker on a hot plate or Bunsen burner and stir constantly over a high heat until bubbles form all around the edge.
4. Add the sugar. Bring the mixture to a boil and boil hard, while stirring, for one minute. Be sure to adjust the heat source so that the liquid does not boil up the sides of the beaker. Caution! This can boil over very quickly if it's not carefully watched.
5. Using gloves, remove the beaker from the heat source. Place the beaker on a heatproof pad to cool. Allow the jelly to cool. Use a spoon to skim off the foam on the top.
6. Record your results.

Part 2

1. Measure out 26 grams (1/8 cup) of sugar.
2. Repeat steps 2, 3, 4, and 5 in Part 1.
3. Record your results.

Part 3

1. Measure out 106 grams (1/2 cup) of sugar.
2. Repeat steps 2, 3, 4, and 5 in Part 1.
3. Record your results.

DATA TABLE - JELLY CONSISTENCY

EXPERIMENT	JELLY	CONSISTENCY
Part 1	Normal	
Part 2	Half sugar	
Part 3	Twice sugar	

Questions

1. How did the consistency of the jelly change when you changed the ratio of sugar to pectin?

2. Why did the consistency change when you changed the ratio of sugar to pectin?