

## Try This

So, how well do you know the sugar content of the beverages you drink?

Rank the following four beverages from lowest sugar content to highest: Coke, grape juice, Powerade, and orange soda.

Along with adding calories to a beverage, dissolved sugar also increases the density of the solution. In this activity you will first determine the density of five known (standardized) solutions: 0% (plain water) 5%, 10%, 15%, and 20%. You will then create a density vs. sugar content graph. Finally, you will determine the densities of the four beverages, and then use the graph to approximate their sugar contents.

**Safety note:** *Never drink a beverage that has been opened or used in the laboratory (or has been put in laboratory glassware). Dispose of all solutions down the sink.*

### You will need:

- Coke grape juice, powerade, and orange soda. Note: carbonated beverages should be de carbonated by pouring them back and forth between two cups and setting them out overnight.
- Standardized sugar solutions: 0%, 5%, 10%, 15%, and 20%. For example to make up a 5% sugar solution dissolve 5 grams of table sugar in 95 grams of water. Note: The sugar found in soda is usually fructose; however table sugar is sucrose. Since sucrose and fructose solutions have very similar densities, this substitution will have very little impact on your results.
- 200 ml beaker
- 100ml graduated cylinder
- Balance
- Graph paper

### What to do:

- 1) Find the mass of an empty 200 ml beaker.
- 2) Use a graduated cylinder to measure exactly 100 ml of 0% sugar solution (pure water). Remember to read the bottom of the meniscus when measuring volume. Pour the solution into the 200 ml beaker and find its mass. Pour the solution down the drain.
- 3) Repeat step 2 with the 5%, 10%, 15%, and 20% standard solutions and the four beverages.

## Data:

Mass of empty 200 ml Beaker \_\_\_\_\_

Standard Sugar Solutions:

Sugar content	Mass of 100 ml of solution with beaker	Mass of 100 ml of solution	Density
0%			
5%			
10%			
15%			
20%			

Beverages:

Name of drink	Mass of 100 ml of solution with beaker	Mass of 100 ml of solution	Density	Sugar content (estimated from graph)
Coke				
Grape Juice				
Powerade				
Orange Soda				

## Calculations:

- 1) Calculate the density of each of the standardized solutions.
- 2) Carefully plot the calculated densities versus sugar content for the five standardized solutions. Graph sugar content on the x-axis and density on the y-axis. Use a ruler to draw a line of best fit through the points.
- 3) Calculate the densities of the four drinks.
- 4) Use the densities of the four beverages to approximate their sugar contents. To do this, start on the y-axis at the density of the beverage; then follow the line over to the line of best fit you drew; then go straight down to the x-axis to determine the corresponding sugar content.

## Questions:

- 1) Which of the beverages had the highest sugar content?
- 2) Did any of the beverages have more sugar than you expected? If so which ones.
- 3) Will what you learned about the sugar content of these beverages change the amount or type of beverages that you consume?