STEM Sims™

Concentration

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Do you need an idea for a scientific study?
Try out one of our ideas or make one of your own.

Knowing how much is in something is important when you make a powdered drink. Too much and the drink tastes bad, too little and it's like drinking water. Take the following brief quiz to see how much you already know about solutions and their concentrations. See the bottom of page 4 to check your answers.

1. All the following are used to measure the concentration of a solution *except*:
   a. ppm.
   b. molarity.
   c. normality.
   d. solarity.

2. The color of human urine is an indicator of a person's level of hydration.
   a. true
   b. false

3. An unlimited amount of salt can be dissolved in one gallon of water.
   a. true
   b. false

4. Vinegar used on salads is a solution of water and:
   a. table salt.
   b. sodium hydroxide.
   c. acetic acid.
   d. lead acetate.

5. Brass is a solid solution made of copper and:
   a. gold.
   b. silver.
   c. magnesium.
   d. zinc.

A Human Spectroscope

Materials Required

5-clear plastic cups	red colored powered drink mix
water source	1- straw
1- spoon	1 -marker

Procedure

1. Make sure to have permission before conducting this investigation.
2. Label four (4) of the plastic cups each with one number (1, 2, 3, and 4).
3. Label the remaining cup with an "X."
4. Place all five cups on a flat surface, such as kitchen counter.
5. Fill each cup about 3/4 full with water.
6. Place the amount of red-colored powder in each of the four cups according to Table 1 below.

Table 1. Solution Data

Cup #	Amount of Red-Colored Drink Mix Powder	Observations
1	¼ spoonfull	
2	½ spoonfull	
3	¾ spoonfull	
4	1 spoonfull	
X		

7. Without watching, have someone else place some red-colored drink mix on the cup labeled "X."
8. Use the straw to carefully stir all the drinks.
9. Use your observational skills to determine how much powered drink mix went into the cup labeled "X." Record this value in Table 1 above.

Questions

1. Describe how you determined the amount of powered drink mix in cup "X."

2. Describe the relationship between the amount of powered drink mix and the final concentration of the drink.

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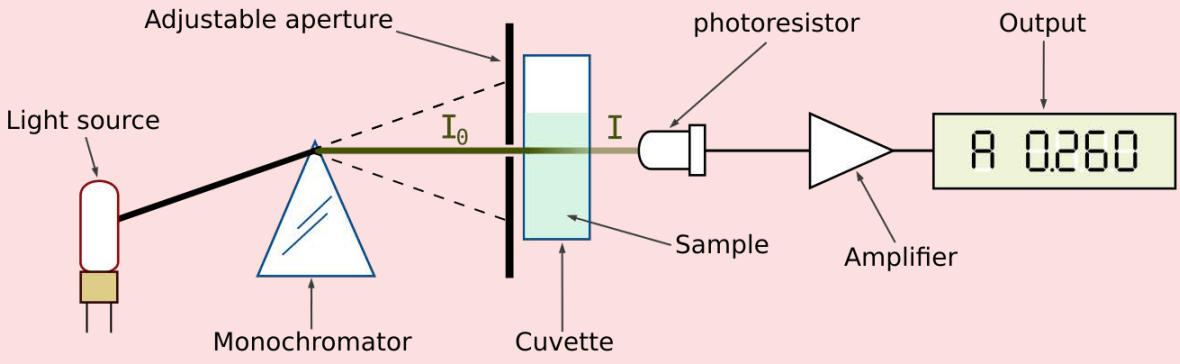
Spectroscopy

One of the most useful ways that spectroscopy is used is in the analysis of crime scene samples. It's not enough to only know what substance is at a crime scene, but also how much of the sample exists. For instance, let's say that a poison such as arsenic is found in a glass next to a person who police suspect has been murdered. Is this enough evidence to convict a person of the crime? Not at all! Police must also know the concentration of the poison to know whether a lethal dose of the arsenic was present. Spectroscopy can answer this and many other such questions.

Spectroscopy is the study of the absorption and emission of light by matter. To determine the concentration of a solute in a solution, the amount of light absorbed by the particles in the solution is most important. Light is "shot" through a liquid solution and collected on the other side of the solution. The more solute present in the solution, the greater the amount of light absorbed by the solute, the less light is transmitted through the solution.



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Answers: Page 2 Answers: 1) d, 2) a, 3) b, 4) c, 5) d. **Page 3 Answers:** A Human Spectroscope. 1) Answers will vary. 2) The more powdered drink mix, the greater the solution concentration.