Module 10: Solutions

Topic 3 Application: Drink Mix Concentration Scientific Investigation

Before you begin the scientific investigation below, make sure to download the *Drink Mix Concentration Scientific Investigation Report*. As you complete this scientific investigation, fill in any needed information on the report template. If you need more information about each section of the report, please visit the Developmental module.

Introduction

Have you ever had a glass of water mixed with drink mix? You know that if you add too much of the drink mix, your drink will be too sweet. If you add too little of the mix, then your drink will taste watered down. In this activity, you will gain experience in making different concentrations of a solution. There are many different ways to calculate concentration. You will concentrate on molarity, molality, and percent by mass.

Objectives

In this scientific investigation, you will:

- practice concentration calculations as you prepare three different solutions using water and drink mix.

Hypothesis

Using the **Procedure and Data Collection** section below, read through the procedural information for this scientific investigation. Based on your understanding of the procedure, develop your own hypotheses which describe your expected results. You should consider the following question: What concentration will create the best tasting drink solution? Record these hypotheses in the **Hypothesis** section of your *Drink Mix Concentration Scientific Investigation Report*.

Equipment and Materials

- Drink mix powder (with sugar)
- Spoon or stirring rod
- Balance
- Plastic cups
- Metric measuring cups
- 100 mL graduated cylinder

Procedure

1. Calculate the number of moles of drink mix powder that is needed to make three solutions: 0.2 M, 0.5 M, and 0.8 M. Record your answers in the data table provided on your *Drink Mix Concentration Scientific Investigation Report*. In order to complete this calculation; assume the molar mass of the drink mix powder is the same as sugar: $C_6H_{12}O_6$.
2. Calculate the number of grams of drink mix powder is needed to make three solutions; 0.2 M, 0.5 M, and 0.8 M. Record your answers in the data table provided on your *Drink Mix Concentration Scientific Investigation Report*.
3. Using your calculations from the data table, prepare each solution. Measure the proper amount of drink mix powder and add it to each plastic cup. Then add 100 mL of water.

4. Calculate the molality and percent by mass for each solution. Record your answers in the data table provided on your *Drink Mix Concentration Scientific Investigation Report*. In order to complete these calculations, remember that 1 gram of H_2O is equal to 1 mL.

Data

Use the data table provided on your *Drink Mix Concentration Scientific Investigation Report* to record your data from this scientific investigation. The data table is also shown below.

	Solution #1 (100 mL of 0.2 M solution)	Solution #2 (100 mL of 0.5 M solution)	Solution #3 (100 mL of 0.8 M solution)
Calculate the number of moles of drink mix powder needed (molarity)			
Calculate the number of grams of drink mix powder needed			
Grams of solute			
Grams of solvent			
Molality			
Percent by mass			

Data Analysis

In the **Data Analysis** section of your *Drink Mix Concentration Scientific Investigation*, provide the responses to the following question:

1. Using a taste test, which concentration of solution do you like the best? Explain.
2. Does your taste preference match the suggestions from the company that makes the drink mix powder?

Conclusion

Using the **Conclusion** section of your *Drink Mix Concentration Scientific Investigation*, compose three to four sentences describing an overall conclusion about the different solutions you observed. Base your conclusions on your data. Were your hypotheses true or false, and how do you know? Use the data and notes that you collected from your experiment to form your conclusion. Make sure that your include information that your gained from data analysis to support your conclusion.

Experimental Sources of Error

On your *Drink Mix Concentration Scientific Investigation*, provide responses to the following questions: Are there any sources of error? If so, what are they, and what could be done to minimize error?

Module 10: Solutions

Topic 3 Application: Drink Mix Concentration Scientific Investigation

Once you have completed the *Drink Mix Concentration Scientific Investigation*, please submit your work to the dropbox.