

Cereal Dilution

Concentration of Solutions



Introduction

Many students have a difficult time understating the concept of serial dilution. A little bit of milk and cereal will create a gggrrreat model for this concept!

Concepts

- Serial dilution

Materials

Breakfast cereal (e.g., Total™, Special K™, etc.)

Milk, 500 mL

Beaker, 50-mL

Beaker, 400-mL

Cereal bowls, 4

Graduated cylinders, 100-mL, 4

Spoon

Safety Precautions

Do not ingest the cereal, water or milk used in this demonstration. Once food is introduced into a laboratory setting, it should be considered a chemical and no longer a food item.

Procedure

1. Place the four cereal bowls on the table.
2. Fill the 400-mL beaker full of cereal and add this to the first bowl.
3. Add 100 mL of milk to completely cover the cereal. Let the cereal stand until it gets soggy.
4. Stir the bowl with a spoon and use the 50-mL beaker to remove about 10 mL of the cereal /milk mixture. Add this to the next bowl.
5. Repeat steps 3 and 4 for the next two bowls.
6. Compare the “concentrations” of cereal in each bowl.

Disposal

The milk may be rinsed down the drain. The soggy cereal should be placed in the trash.

Discussion

Serial dilution is used to create a dilute concentration of a solute from a concentrated standard solution. In this method, a series of dilutions are performed, with each dilution created from the previously diluted solution.

To create a 0.001M NaCl solution from a 1.00 M NaCl solution by serial dilution;

1. Use a volumetric pipet to take 5.00 mL of the 1.00 M NaCl solution and add this to a 100-mL volumetric flask. Fill the flask to the 100 mL mark and mix. The concentration of NaCl in this intermediate solution is

$$(1.00\text{M}) \cdot (5\text{mL}/100\text{mL}) = 0.050 \text{ M NaCl}$$

2. Use a volumetric pipet to take 2.00 mL of the 0.050 M NaCl solution and add this to a 100-mL volumetric flask. Fill the flask to the 100 mL mark and mix. The concentration of NaCl in this intermediate solution is

$$(0.050\text{M}) \cdot (2\text{mL}/100\text{mL}) = 0.0010 \text{ M NaCl}$$

Connecting to the National Standards

This laboratory activity relates to the following National Science Education Standards (1996):

Unifying Concepts and Processes: Grades K–12

Systems, order, and organization

Content Standards: Grades 5–8

Content Standard B: Physical Science, properties and changes of properties in matter

Content Standards: Grades 9–12

Content Standard B: Physical Science, structure of atoms, structure and properties of matter

Flinn Scientific—Teaching Chemistry™ eLearning Video Series

A video of the *Cereal Dilution* activity, presented by Lee Marek is available in *Concentration of Solutions*, part of the Flinn Scientific—Teaching Chemistry eLearning Video Series.

Materials for *Cereal Dilution* are available from Flinn Scientific, Inc.

Catalog No.	Description
GP1005	Beaker, Borosilicate Glass, 50-mL
GP1025	Beaker, Borosilicate Glass, 400-mL
GP2020	Graduated Cylinder, 100-mL

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.