

How to Prepare a Catalase Solution



Introduction

Hydrogen peroxide is decomposed by the enzyme catalase. This reaction is very visible and easily measured. As a result, catalase is commonly used for enzyme studies. Careful preparation of catalase solutions can greatly affect experimental results.

Concepts

- Kinetics
- Enzymes

Materials

Catalase	Beaker
Water, distilled or deionized	Graduated cylinder
Balance, analytical	Magnetic stirrer (optional)

Safety Precautions

Wear chemical splash goggles, chemical-resistant gloves and a chemical-resistant apron. Please review current Safety Data Sheets for additional safety, handling, and disposal information.

Procedure

1. Determine the total volume of catalase solution required. This volume is equal to the amount of distilled or deionized water required to prepare the catalase solution. Use a graduated cylinder to measure this amount into a beaker.
2. Determine the concentration of catalase solution required in units/mL.
3. Multiply the concentration of the desired catalase solution (in units/mL) by the total volume of solution (in mL) required. This will be the number of units of catalase required.
4. Divide the result from step 3 by the units/mg shown on the catalase label. In the event that the label shows two values—one for units/mg solid and one for units/mg protein—use the smaller of the two numbers in the calculation. The smaller number should refer to units/mg solid. This total will be the number of mg of catalase required to prepare the solution.
5. Weigh the appropriate number of mg of catalase needed as calculated in step 4. An analytical balance will be required to weigh in milligrams.
6. Add the catalase to the measured distilled or deionized water from step 1 and gently stir the solution using a magnetic stirrer until the solid has dissolved.
7. Immediately place on an ice–water bath to inhibit the decomposition of the catalase enzyme.

Calculation Example

1. For this example, let's say 500 mL of catalase solution is required.
2. The concentration required for this experiment is 400 units/mL.
3. $400 \frac{\text{units}}{\text{mL}} \text{ catalase solution} \times 500 \text{ mL water} = 200,000 \text{ units of catalase}$
4. For this example, let's say the catalase label reads 1800 units/mg.
 $200,000 \text{ units} \div 1800 \frac{\text{units}}{\text{mg}} = 111 \text{ mg of catalase}$

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5. Weigh out 111 mg of catalase on an analytical balance.
6. Dissolve the 111 mg of catalase in 500 mL of distilled or deionized water. The result is a 400 units/mL catalase solution.

Tips

- Proper storage of powdered catalase requires refrigeration or freezing and the shelf life of many enzymes is poor. All enzymes should be used within one year of purchase. Catalase solutions are extremely perishable and should not be stored. Prepare catalase solution within one hour of use.
- This preparation of catalase solution may be used to prepare the 400 units/mL solution in the Enzyme Catalysis AP Biology Laboratory Kit.
- The rate time depends on the activity of the catalase solution, which is related to both its concentration and the purity or activity of the enzyme itself. Test the activity of the enzyme solution in 2% hydrogen peroxide before using in a demonstration or other laboratory activity. Adjust the concentration as needed to obtain convenient rate times.

Disposal

Please consult your current *Flinn Scientific Catalog/Reference Manual* for general guidelines and specific procedures, and review all federal, state and local regulations that may apply, before proceeding. Catalase solution may be flushed down the drain with excess water according to Flinn Suggested Disposal Method #26b.

Materials for *How to Prepare a Catalase Solution* are available from Flinn Scientific, Inc.

Catalog No.	Description
C0359	Catalase, 1 g
FB1829	Enzyme Catalysis Laboratory Kit, AP Biology Lab 2—3 groups
FB1830	Enzyme Catalysis Laboratory Kit, AP Biology Lab 2—8 groups

Consult the [Flinn Scientific website](#) for current prices.