

# Genie in a Bottle

Hydrogen peroxide is catalytically decomposed to produce a cloud.

<b>Application</b>	Catalysis • Decomposition • Hydrogen Peroxide
<b>Theory</b>	Hydrogen peroxide decomposes to form oxygen and water. This reaction is a slow reaction at room temperature. Catalysts speed up reactions. It is catalyzed by many substances including KI and the $MnO_2$ used here. The enzyme catalase present in blood is what causes the bubbling when $H_2O_2$ is used as a disinfectant for cuts. The exothermic reaction generates enough heat to produce large amounts of water vapor. Hence, the <i>Genie</i> effect.
<b>Materials</b>	<i>Magic Genie</i> , Flinn Demo Kit, AP2092 or 1000-mL Kjeldahl or volumetric flask Aluminum foil Hydrogen peroxide, 30% solution, $H_2O_2$ (40 mL) Tea bag or tissue paper Thread or fine copper wire Manganese dioxide, $MnO_2$ (1 g) or potassium iodide, KI (2 g) 1-hole Rubber stopper
<b>Safety Precautions</b>	Hydrogen peroxide is severely corrosive to the skin, eyes and respiratory tract; a very strong oxidant; and a dangerous fire and explosion risk. Manganese dioxide is a strong oxidant and moderately toxic. The reaction flask will get hot, use a Pyrex® flask. Wear chemical splash goggles, chemical-resistant gloves and a chemical-resistant apron.
<b>Preparation</b>	A Kjeldahl flask works well if you have one around. Volumetric flasks work equally well. Wrap the flask in foil to maintain the mystery.  Place 30 to 40 mL of 30% hydrogen peroxide carefully into the flask using a long stem funnel so no peroxide gets on the neck of the flask. Be certain the flask is secure from tipping over.  Prepare a “sachet” of about one gram of manganese dioxide, like a tea bag using tissue or toilet paper making sure none of the catalyst comes through the paper. Tie the bag with thread, string or fine wire.  Hang the bag in the top of the neck of the flask and hold it in place with a 1-hole rubber stopper. The stopper must have a hole in it—allowing the steam to escape in case a reaction occurs inadvertently.
<b>Demonstration</b>	Initiate the reaction by removing the stopper and permitting the bag to fall into the peroxide. The reaction may take a few seconds, be patient.
<b>Disposal</b>	The solution can be flushed down the drain with excess water.