Catalytic Decomposition of $\text{H}_2\text{O}_2$ – Aladdin’s Lamp

Description: MnO$_2$ is used as a catalyst to decompose H$_2$O$_2$ to liberate water, oxygen and heat.

Materials:

- 30% H$_2$O$_2$
- 2 g MnO$_2$
- 1 L Florence flask
- Aluminum foil

Procedure:

1. Pour 50 mL of 30% H$_2$O$_2$ in the 1 L flask. Place the MnO$_2$ in a KemWipe and tie together with a piece of string. Hang the MnO$_2$ inside the flask by securing the string against the mouth of the flask with a rubber stopper. For demonstration purposes, cover the flask with aluminum foil.

2. When ready (some may tell a story of a genie in a bottle), remove the stopper and stand back. Steam will vigorously shoot from the mouth of the flask.

Discussion: The decomposition of H$_2$O$_2$ occurs on its own to generate water and oxygen however many substances are known to catalyze this reaction. This experiment demonstrates the concept and utility of catalysts in that MnO$_2$ is unchanged even after the reaction has occurred. Using MnO$_2$ as a catalyst allows H$_2$O$_2$ to decompose along a reaction pathway with a smaller energy barrier.

$$2 \text{H}_2\text{O}_2 \text{(aq)} \rightarrow 2 \text{H}_2\text{O} \text{(l)} + \text{O}_2 \text{(g)}$$

Safety: Wear proper protective equipment including gloves and safety glasses when preparing and performing this demonstration. Concentrated hydrogen peroxide can cause burns.

Disposal: The remaining manganese can be dried and reused, otherwise water can be decanted and remaining solid can be placed in a solid waste container.
Reference:


Video:

http://www.metacafe.com/watch/399987/genie_in_a_bottle_experiment/

http://www.youtube.com/watch?v=nwhez8IEPXA