

10.5A Vapor Phase Oxidation II - Acetone

Subjects: Gaseous properties, oxidation

Description: A piece of copper foil is suspended above a container containing acetone. The copper wire will continue to glow red hot suspended above the liquid.

Materials:

200 mL acetone‡

500 mL beaker

Coiled copper wire with copper foil piece attached at one end, with the other end wrapped around a glass stir rod

Burner*

matches

*Shared item: Located in the top drawer of the central bench opposite the shelving.

‡Acetone is located in the flammables cabinet.

Procedure:

1. Pour 200 mL of liquid in the 500 mL beaker
2. Heat the copper wire in the flame until it glows red.
3. Suspend the wire above the liquid and turn off the lights in the room. The wire will continue to glow.

Discussion:

Acetone is oxidized to acetaldehyde, carbon dioxide, and water. Copper catalyzes the reaction shown below:



The oxidation is an exothermic process, which releases enough heat to keep the copper wire glowing.

Safety: Acetone is a highly flammable liquid. Care must be taken to prevent the hot copper wire from igniting the liquid. This demonstration should be performed in the hood or well ventilated area. A fire extinguisher should be ready during the demonstration. According to Shakhshiri, the reaction can produce toxic ketene gas and methane and thus should be performed in the hood.

Disposal: Liquids should be disposed of in appropriate non-halogenated organic waste containers. The copper wire can be kept for future use.

References:

1. B.Z. Shakhshiri; *Chemical Demonstrations: A Handbook for Teachers of Chemistry*; Wisconsin; 1985; Volume 2; P. 216-219

2. Purdue University Department of Chemistry, Lecture Demonstration Movie sheets:

http://chemed.chem.purdue.edu/demos/main_pages/19.5.html

3. Eduard Job Foundation for Thermo and Matter Dynamics, Germany - Demonstrations Website:

<http://job-stiftung.de/index.php?id=31,0,0,1,0,0>