

**Safety:**

safety glasses



Remove the needle points with the pair wire cutters. Be careful not to crush the tube while doing this.  
Concentrated acids can burn you severely if you don't treat them with respect!

**Instruments:**

- 1 reaction vessel with a side arm
  - 1 threaded tube
  - 1 threaded coupling 20/20
  - 1 adaptor ball
  - 1 powder funnel
  - 1 5ml syringe (or 5ml pipette with Peleus ball)
  - 1 2ml syringe
  - 1 (pink) needle (1,2 / 40 mm)
  - 1 pair wire cutters
  - retort stand materials
- (an angle of roughly 45°  
from small glass part  
building kit)

**Chemicals:**

- potassium permanganate crystals,  $\text{KMnO}_4$  (H: 272-302-410; P: 210-273)
- ethanol,  $\text{C}_2\text{H}_5\text{OH}$  (H: 225; P: 210)
- concentrated sulfuric acid,  $\text{H}_2\text{SO}_4$  (H: 314; P: 280-301+330+331-309-310-305+351+338)

**Preparation:**

Darken the room in order to better observe the lightning effects.  
Snip the sharp tips off the needles using wire cutters. Be careful not to crush the tubes when doing so!

**Experiment:**

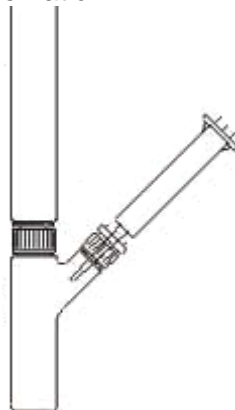
- Put sulfuric acid ( $\text{H}_2\text{SO}_4$ ) into the reaction vessel using the 5 ml syringe. Do not let any acid splash onto the side walls of the vessel!
- Fasten the vessel securely using a retort stand, clamps, etc.
- Put the threaded coupling (20/20) and threaded tube onto the reaction vessel. The adaptor coupling goes on the side arm of the vessel

**Experiment:**

- Measure 2ml of ethanol (C<sub>2</sub>H<sub>5</sub>OH) in a syringe and **carefully** cover the acid with the ethanol through the side arm. The liquids should **not** mix together! Do not let the liquids warm up too much (think boom!).
- Place the powder funnel onto the threaded tube and put several potassium permanganate crystals (or a small amount of powdered KMnO<sub>4</sub>) onto the liquids

Alternative:

A test tube can be substituted, however, the layering of the liquids becomes highly problematic.

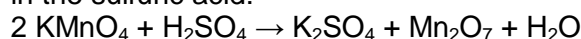
**Observations:**

Bright flashes of light can be observed at the intersection of the two liquids after a short time.

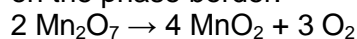
**Results:**

Potassium permanganate reacts with sulfuric acid to form dimanganese (VII)oxide. This intermediate product can oxidize organic compounds in an explosive manner (especially at higher temperatures). Dimanganese (VII) oxide decomposes to manganese dioxide and oxygen on the phase border between the liquids. The very reactive oxygen then oxidizes the alcohol in turn.

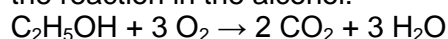
in the sulfuric acid:



on the phase border:



the reaction in the alcohol:

**Disposal:**

After cooling the reaction products down and diluting them, they can be disposed of in the heavy metal container.

**Literature tip:**

A video for this experiment is downloadable in the Internet under:  
<http://www.netexperimente.de> [last accessed on 11.Juli 2007]