

# The Effect of Temperature on Equilibrium

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There are three sealed glass bulbs which contain dinitrogen tetroxide (colorless at room temperature) and nitrogen dioxide (brown at room temperature). When the first bulb is heated, the color will intensify as the dinitrogen tetroxide dissociates. As the second bulb is cooled with liquid nitrogen, the bulb will become colorless. The third bulb will be used as a control.

### MATERIALS

- 3 500mL glass bulbs containing dinitrogen tetroxide and nitrogen dioxide
- 1L beaker with about 600mL of D.I. water
- Hot plate
- Dewar with about 2L of liquid nitrogen
- Safety shield
- Styrofoam cooler
- Insulating gloves
- Safety glasses

### PRESENTATION

***-Begin heating about 600mL of D.I. water at the beginning of class or at least 10 minutes before the demonstration.***

- This demonstration can be done in any order that is preferred. There are a couple of things to keep in mind.
  - This should be done behind the safety shield because of the risk of implosion and explosion. These chance of this happening is very minimal but it is always a good idea to stay safe.

## DISCUSSION

- $\text{N}_2\text{O}_4(\text{g}) + \text{Heat} \rightleftharpoons 2\text{NO}_2(\text{g})$

## HAZARDS

- *If a bulb is broken, evacuate the room immediately and contact the prep-room.*

## REFERENCES

B.Z. Shakhashiri, *Chemical Demonstrations*, Vol. 2, P.180

[Undergraduate](#)<sup>[1]</sup>

Department of Chemistry and Biochemistry at The University of Arizona  
P.O. Box 210041, 1306 East University Blvd., Tucson, AZ 85721-0041  
Phone: 520.621.6354 Fax: 520.621.8407

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