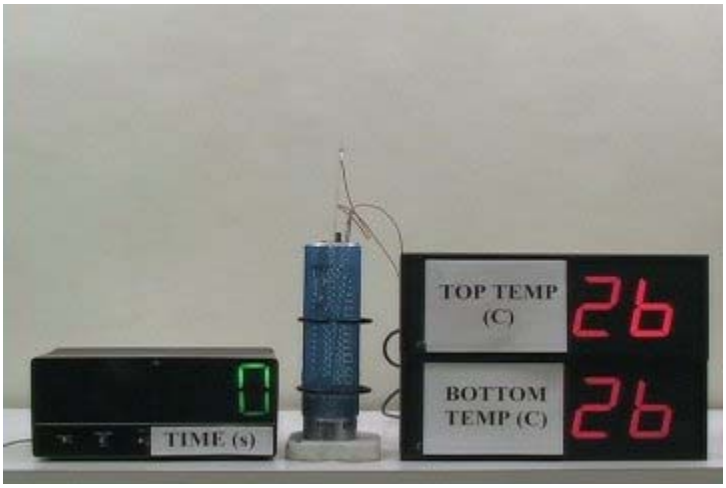
Question #314

The figure below shows a 1000-milliliter dewar filled with water, with thermal probes at the very top and the very bottom. The temperature of the water is 26^{o}C (around room temperature), as measured by both probes and seen on the large digital displays at the right in the photograph. An electric heater positioned near the top of the water. When the heater is turned on, it begins to heat the water. As time goes by, measured in seconds by the digital timer at the left in the photograph, we can measure the temperature of the water at the top and the bottom of the dewar, displaying the temperature of the water at the top and the bottom of the dewar as a function of elapsed time. Click on the photograph below to see the action (or lack thereof) for the first few seconds.

Perhaps it is appropriate to share a few numbers: the volume of the dewar is 1000 ml, the heater draws a little over 1 ampere at 110 VAC (60 Hz) so it produces about 125 Watts of heating.



The question this week involves how the temperature of the water near the top and near the bottom of the dewar will change with time as the heater heats the water near the top of the dewar.

Part 1: After about thirty minutes (1800 seconds) the temperature of the water near the *top* of the dewar will be:

- (a) less than 26^{o}C.
- (b) about 26^{o}C.
- (c) about 30^{o}C.
- (d) about 50^{o}C.
- (e) about 75^{o}C.
- (f) almost 100^{o}C.

Part 2: After about thirty minutes (1800 seconds) the temperature of the water near the *bottom* of the dewar will be:

- (a) less than 26^{o}C.
- (b) about 26^{o}C.
- (c) about 30^{o}C.

- (d) about 50^{o}C.
- (e) about 75^{o}C.
- (f) almost 100^{o}C.

Click here for Answer #314 after April 21, 2008.

Question of the Week

Outreach Index Page

Lecture-Demonstration Home Page

For questions and comments regarding the *Question of the Week* contact Dr. Richard E. Berg by e-mail or using phone number or regular mail address given on the Lecture-Demonstration Home Page.