In this section of Resonance, we invite readers to pose questions likely to be raised in a classroom situation. We may suggest strategies for dealing with them, or invite responses, or both. “Classroom” is equally a forum for raising broader issues and sharing personal experiences and viewpoints on matters related to teaching and learning science.

Cylindrical Furnace Made of Rejected Rheostats

A cylindrical furnace for high temperature was designed and made in the laboratory in a simplified way. A rejected low current lab rheostat 30cm in length and 6.3cm diameter was reused. First, its original winding and sliding contact were stripped off and a new kanthal wire (16 SWG) winding was done over the ceramic cylinder. The ends of the winding were connected to the two end terminals of the rheostat. The heating current was controlled through a rheostat. Thus the temperature was controlled by varying the current through the winding. Further, the winding was enclosed with the help of properly molded fire bricks to avoid heat loss. These provide proper thermal insulation necessary for high temperature. Two pieces of fire bricks were used to cap the two ends of the cylinder whenever required. A digital thermometer was used to measure the temperatures. To control the atmosphere, one can make arrangement for regular gas flow through the chamber. Such a furnace can be used for temperature upto 1000°C with heating zone of about 15cm and temperature control of ± 15°C. The samples to be fired are put in crucible/silica boats and slid into heating zone by a rod. The crucible is similarly taken out after the firing is complete. While cooling, the temperature is decreased gradually to avoid cracking.

Keywords
Rheostats, cylindrical furnace.
Advantages:

1. It gives us an opportunity to recycle rejected lab rheostats, and we can avoid purchasing costly quartz tubes, making the furnace economical.

2. It provides better terminal connections and contacts.

3. It is also sturdy and no extra support is needed.

4. Use of fire bricks improves thermal insulation as compared to asbestos.

5. It becomes even more compact and portable if the high current rheostat is replaced by a 32-Amp autotransformer. The autotransformer could be calibrated to provide temperature settings directly, eliminating the need for a digital thermometer.

Figure 1. Block diagram of cylindrical furnace.