N94-13740

HIGH TEMPERATURE BEHAVIOR OF GLASS
M-8

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Outline of Experiment

The twofold purpose of this experiment is to obtain data on the occurrence of flow in a viscous glass sphere in microgravity, and to confirm data obtained on Earth for volume-temperature relationships of glass.

To do this, a cubic sample of glass laced with gold particles will be heated in the IMF. The sample's properties will be measured at high temperature, and the volume of the sample varied to measure the expansion coefficient. Movement of the gold particles, if any, will determine flow within the sample. The apparatus for this experiment is schematically shown in Figure 1. Figures 2 and 3 show the photographs of the image furnace with samples before and after melting, respectively. In this apparatus, shape and size of the sample are observed by video camera and recorded by video recorder. The recorded images of the sample are schematically shown in Figure 4. In this figure, symbols A, B, and C denote low, intermediate, and high temperatures, respectively. From these images, the volume of the sample is estimated and the temperature dependence of the volume, which is shown in Figure 5, is obtained.

If there is agreement between the data collected in this experiment and data obtained on Earth, it would tend to verify Earth-collected data.

Expected Results

(1) The volume-temperature relationship obtained in space is compared with the Earth-bound data. The agreement between these data is taken as proof that all the Earth-bound data obtained on various glasses are good.

(2) From the movement, if any, of Au pieces, information about the occurrence of flow inside a viscous glass sphere can be obtained. This information is useful for obtaining homogeneous glass in space.

(3) The quenched sample is subjected to internal stress examinations when returned. This information is useful for examining the quenching and annealing processes in space.

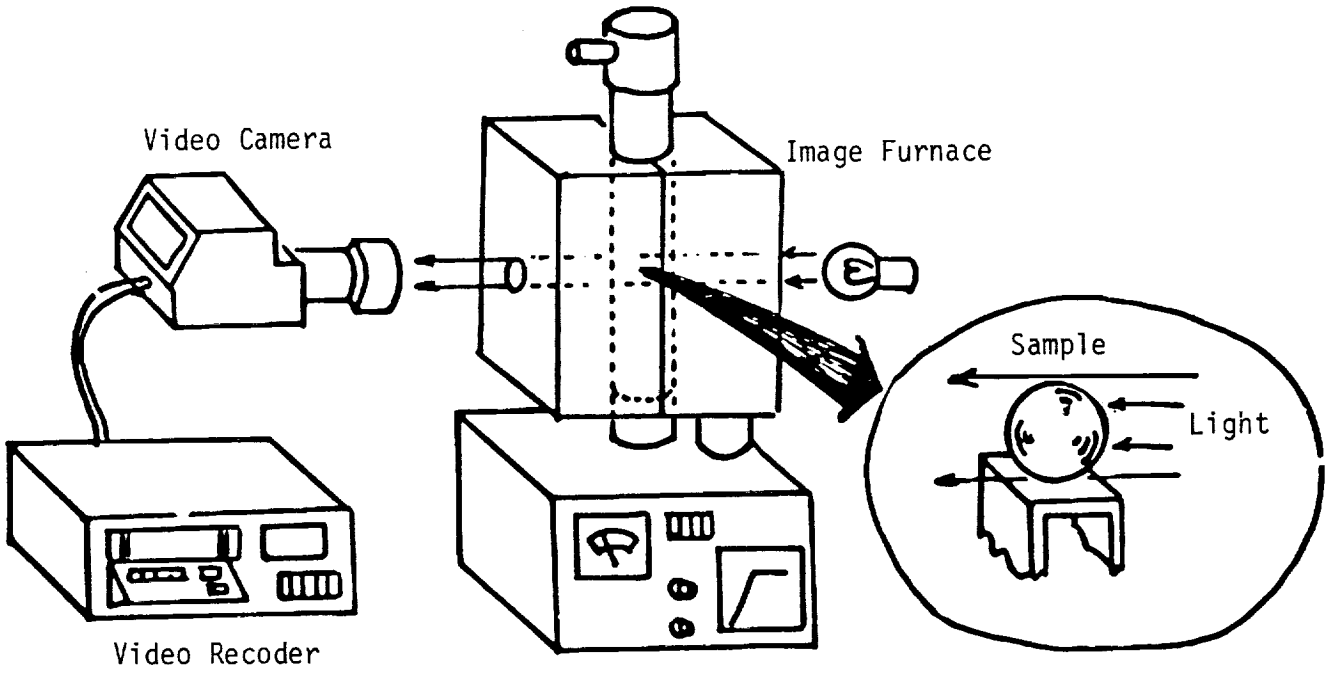

Figure 1. Apparatus for experiment.

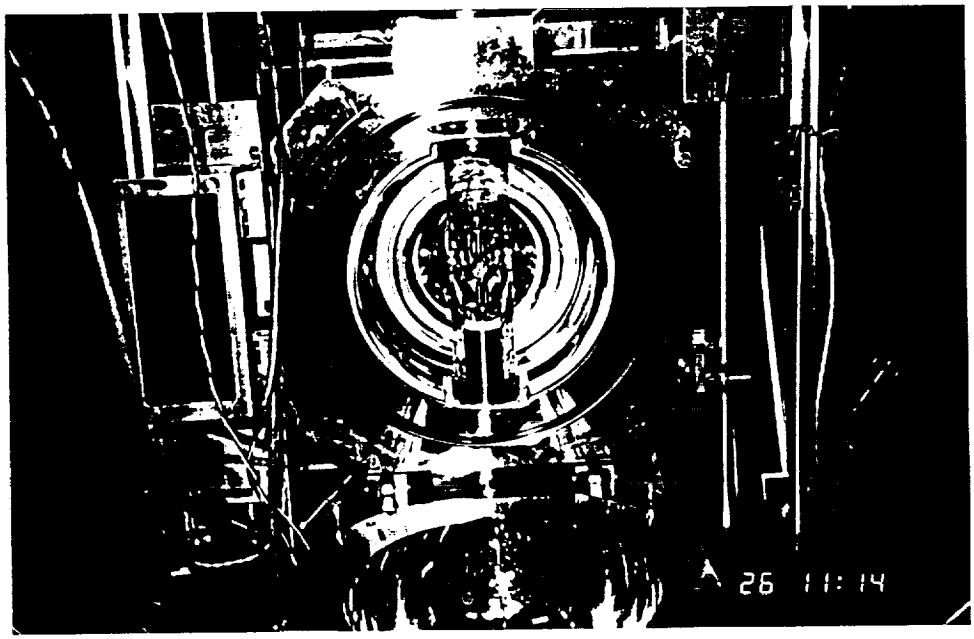

Figure 2. Photograph of image furnace with sample before melting.

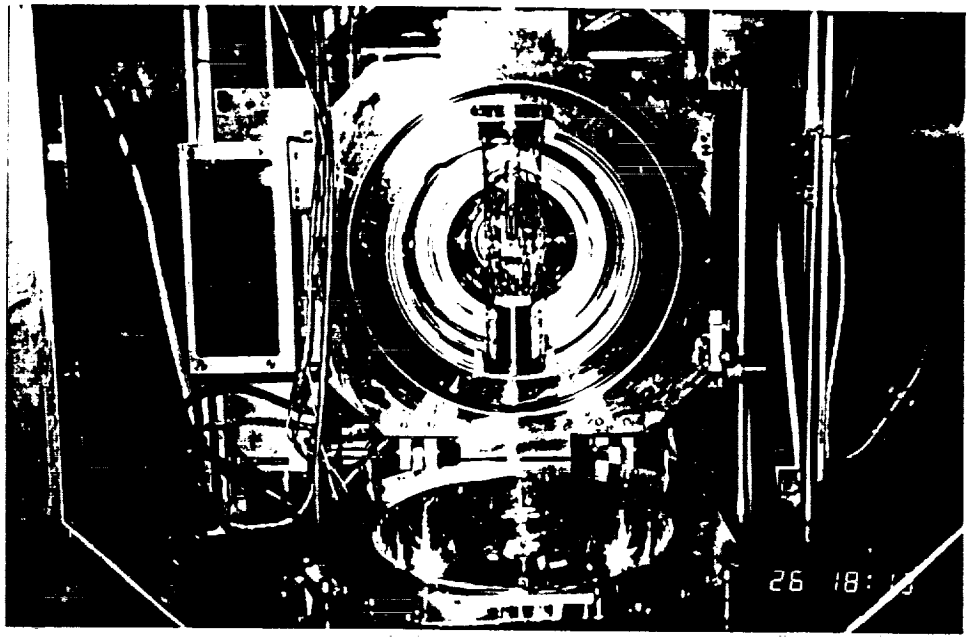

Figure 3. Photograph of image furnace with sample after melting.

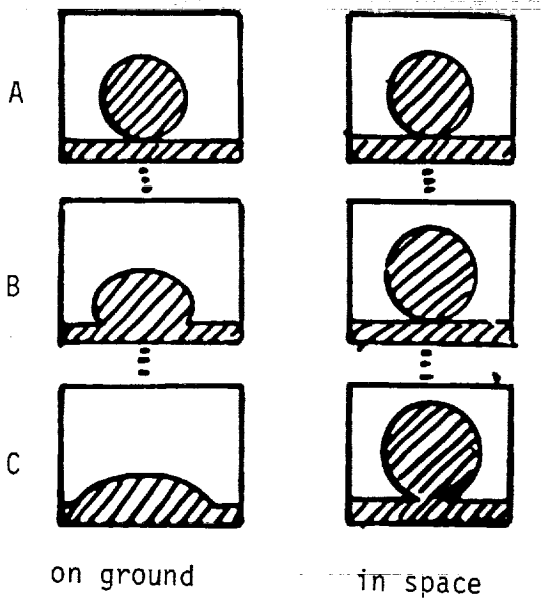

Figure 4. Images of the sample recorded by video recorder.

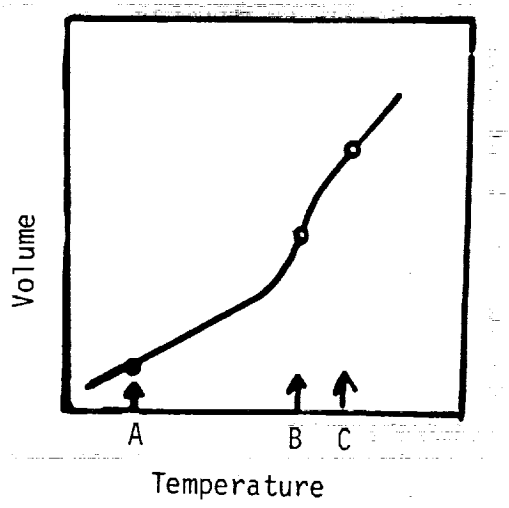

Figure 5. Temperature dependence of the glass sample.