

32000 Absolute Zero Device

Purpose:

This device is designed to show the relationship between pressure and temperature of a gas and to experimentally determine the value of absolute zero.

Required Accessories:

| | |
|---------------------------------|--------------------|
| One Bicycle air pump | 3 Large containers |
| Alcohol | Ice |
| Graph Paper | Dry Ice |
| Thermometers (-100°C to +100°C) | |

WARNING: Use only boiling water for high temperature bath. Do not use oil of any kind and never subject this device to an open flame, Failure to do so may lead to an unsafe pressure level within the device, which may result in serious injury.

Procedure:

Prepare three temperature baths: Boiling water (100°C), Ice water (0°C) and dry Ice immersed in alcohol (-78°C). Measure and record the pressure reading of the air inside the device at room temperature. Then immerse the bulb, using the non conductive handle, into each of the baths for three minutes. Measure and record the bath temperature and the resulting pressure reading at the end of each three minute cycle.

Draw and plot a graph of pressure versus temperature. The vertical axis will represent the pressure scale and should begin at 0 PSI and end at 30 PSI. The temperature scale on the horizontal axis should range from -300°C to +100°C.

Note: All pressure readings must be in absolute pressure before graphing. 0 PSI represents zero atmospheres, or zero pressure. The gauge needle has been set to indicate the approximate barometric pressure when the pin is pushed on the air valve. The initial pressure inside the apparatus may be set to any convenient value according to local curriculum requirements.

Determine the best fit line of the graph and extend it using dotted lines to where the pressure is 0 PSI. The temperature value for 0 PSI should be approximately -273°C, which is the theoretical value of absolute zero.

Time Allocation:

No prior assembly is required for this product. Individual experiment times will vary depending on methods of instruction, but normally will not exceed one class period.

Feedback:

If you have a question, a comment, or a suggestion that would improve this product, you may call our toll free number below.