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Area	Laboratory-Chemistry
Applicability	Royal Oak

Fortin Type Mercurial Barometer Procedure

Document Type: Procedure

I. PURPOSE AND OBJECTIVE:

To describe how to use the Fortin type mercurial barometer to obtain a barometric pressure reading.

II. Introduction

A Fortin type mercurial barometer consists of a long glass tube, closed at one end, evacuated, filled with mercury and inverted; the open end being submerged in a reservoir of mercury called the cistern. Mercury is supported in the glass tube by the atmospheric pressure acting on the mercury in the cistern and its height is a measure of that pressure. Pressure changes due to weather changes are relatively small and must be measured accurately. During periods of fair weather, the barometric pressure may not change for days on end. With the arrival of foul weather, however, the barometer will drop markedly. The long scales, however, are only necessary to allow for different pressure levels at different elevations. When the pressure increases, the cistern level will be depressed and mercury will rise in the glass barometer tube. The change in the level of the small diameter, glass barometer tube will be greater than that of the large diameter cistern. When taking the reading, the mercury level in the cistern is first set to the white zero pointer, and then the height of the mercury column is measured against a scale.

III. CLINICAL SIGNIFICANCE:

A. The Fortin type mercurial barometer is the reference barometer used by our laboratory.

B. The barometer reading is used to verify the internal barometric measurement of the Radiometer ABL 825 Blood Gas Analyzer.

C. This pressure is used to correct for systematic deviations from the reference method to obtain PO2 and PCO2 values for blood gas samples.

IV. PROCEDURE:

A. Turn the cistern adjusting screw at the bottom of the cistern reservoir until the mercury, as viewed through the cistern glass, just touches the white zero pointer. The white zero pointer will dimple the mercury surface. Light reflection in the dimple will indicate its magnitude. The smaller the dimple, the more accurately the level has been adjusted.

B. Tap the cistern glass, and the upper, small diameter, glass barometer tube at the level of the mercury column meniscus, to bring each meniscus to its average height.

C. Recheck and readjust, if necessary, the level of mercury in the cistern as in Step A.

D. Raise the vernier above the top of the mercury meniscus, and then lower it very slowly, until the bottom edges appear to be just touching the top of the mercury meniscus. To eliminate parallax, the observer's eye should be in the same plane as the front and back lower edges of the vernier sleeve. When the vernier is properly adjusted a white light will be visible at both sides of the mercury meniscus but not at the top. There will however, be a slight haze over the top of the mercury.

E. Read the barometer scale(s) directly adjacent to the lower edge of the movable vernier. Estimate between the lines, then use the lines on the vernier scale to confirm or refine the estimated last digit. If the sixth line on the vernier lines up exactly with a line on the main scale, then your estimated last digit should be a six.

V. CALCULATIONS AND INTERPRETATIONS:

A. See Princo Instruments Barometer Manual for "Equations for Calculating Barometer Corrections: in reference to temperature, gravity, and sea level difference.

VI. PRECAUTIONS:

A. Air must never be allowed to enter the barometer tube. Air in the barometer tube could cause a separation of the mercury column, causing the barometer to read too high. Air could rise to the top, depressing the mercury column and causing the barometer to read too low.

B. The location of the barometer should be a sturdy, plumb wall, which is free from vibrations and fluctuations of temperature and pressure. The barometer should not be close to a radiator or other fluctuating heat source. It should not be in the same room with an air compressor or other source of pressure disturbance.

C. When the barometer is first hung in a new location, readings should not be taken until the scales, mercury column, et cetera, have come to the same temperature as the surrounding atmosphere. This may take up to 24 hours.

VII. REFERENCES:

1. Princo Instruments, Inc, Instruction Booklet for use with Princo Fortin Type Mercurial Barometers, 1983.

Attachments

Reading the Barometer.pdf

Approval Signatures

Step Description	Approver	Date
Medical Director	Ann Marie Blenc: System Med Dir, Hematopath	7/24/2023
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