PROCEDURE FOR PUMP CALIBRATION USED FOR MONITORING OF ASBESTOS DUST EMISSIONS

Calibration of the pumps defines within limits, the true value of the rotameter readings and their corresponding flow rates in liters/minute of air. In order to determine how many fibers/cc of air is present during a sampling period the following information is required:

1. Time of the sampling period.
2. The volume of air sampled during monitoring (expressed as liters/minute).
3. The area of the filter, constant (855 mm^2).
4. The area of the microscope field viewing area portion reticle UCC Nikon (0.0062 mm^2).
5. Number of fibers per viewing field counted on the filter sample.

Equipment *

1. 1,000 ml. glass column with tapered bottom
2. Rubber bulb to attach to column
3. Soap solution
4. Leur slip adaptors (2)
5. Plastic tubing with 1/4" inside diameter
6. Stand with clamps to secure 1,000 ml. column
7. Stop watch
8. Cartridge with filter

* Reference schematic of apparatus Figure #1.
Photograph of apparatus Figure #3.

PLAINTIFF'S EXHIBIT

UC-5218

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Apparatus for Pump Calibration - Before beginning a calibration, it is necessary to wet the walls of the cylinder. The rubber bulb containing a soap solution should be depressed gently with the pump on to create several bubbles in the column.

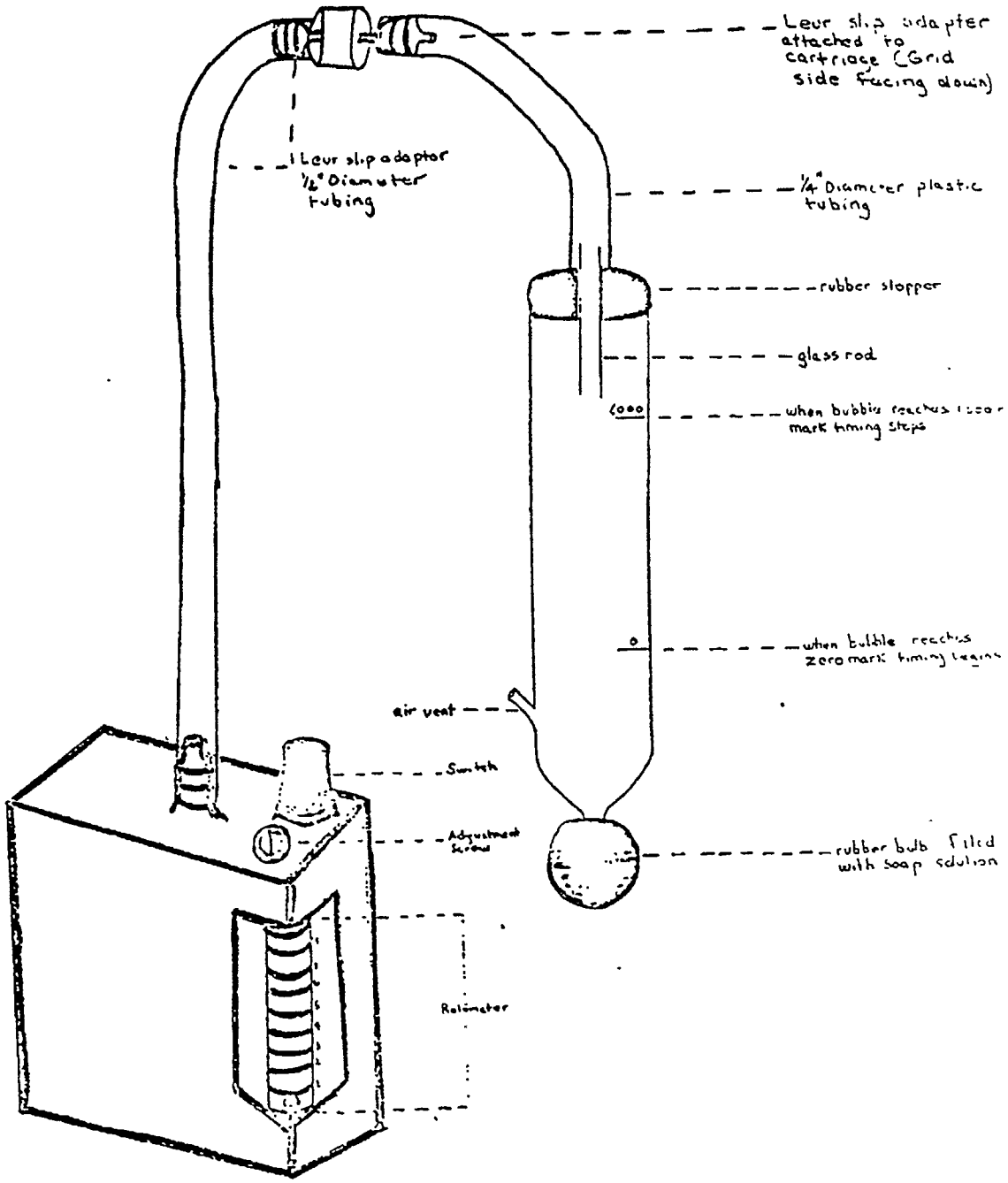


Figure #1
(Not to scale)

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Pump Calibration

A clean filter and cartridge must be used during pump calibration.

Sequence

Step #1 - Be sure the pump is fully charged prior to calibration (8 - 16 hours).

Step #2 - Turn on the pump and raise the black ball in the rotameter to a reading of seven on the scale by adjusting the screw located at the top of the pump. Read the rotameter at the center of the ball.

Step #3 - Gently press the rubber bulb so a single bubble will begin moving up the glass column.

Step #4 - When the bubble reaches the zero mark begin timing with a stop watch.

Step #5 - When the bubble reaches the 1,000 ml. mark stop timing.

Step #6 - Record time (in seconds).

Step #7 - Repeat steps 3 through 6 two more times while the rotameter reading is at seven.

Step #8 - After the three readings have been recorded (in seconds) calculate the average for the three readings.

Example calculations are shown below:

Assume time recordings for the pump at a rotameter setting of 7 were determined as:

for Test 1 27.8 seconds

for Test 2 27.7 seconds

for Test 3 27.9 seconds

Average time = 83.4 ÷ 3 = 27.80 seconds

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The flow rate in liters/minute is calculated as:

$$\text{liters}/27.80 \text{ seconds} \times \frac{60 \text{ seconds}}{\text{minute}} = 2.16 \text{ liters/minute}$$

Step #9 - With the pump on, again lower the black ball in the rotameter until the center of the ball is at six on the scale by adjusting the screw located at the top of the pump.

Step #10 -Repeat steps 3 through 8.

Step #11 -With the pump on, lower the black ball in the rotameter to a reading of three on the scale by adjusting the screw located at the top of the pump and repeat steps 3 through 8.

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After determining the flow rate (liters of air/minute) for each of the rotameter readings at 7, 6 and 3, respectively, the results are then plotted on a graph. Airborne samples for asbestos should be obtained at a flow rate of 2 liters/minute.

Let us assume the following flow rates were obtained by calibration:

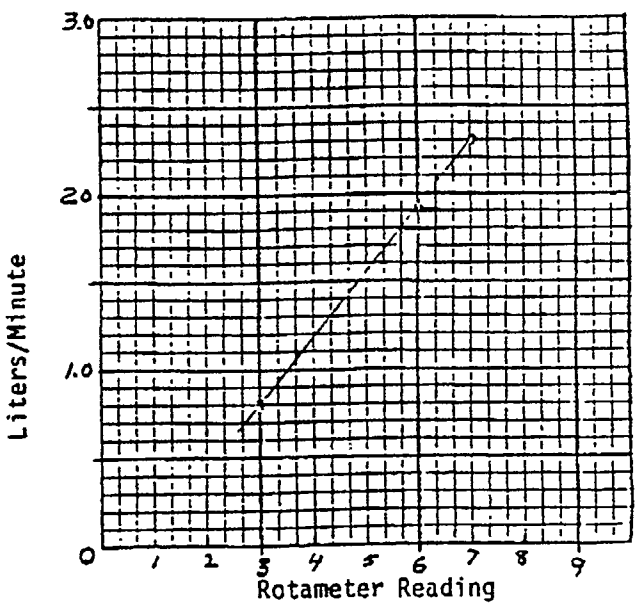
Rotameter reading 7 = 2.16 liters/minute

Rotameter reading 6 = 1.82 liters/minute

Rotameter reading 3 = 0.95 liters/minute

A plot is prepared, as illustrated by the graph (Figure 2). Using the above calculations, the rotameter setting for 2 liters/minute of air is determined from the graph as ~6.3. The graph should be attached to pump for referral prior to each test. The pump should be recalibrated frequently.

Figure #2



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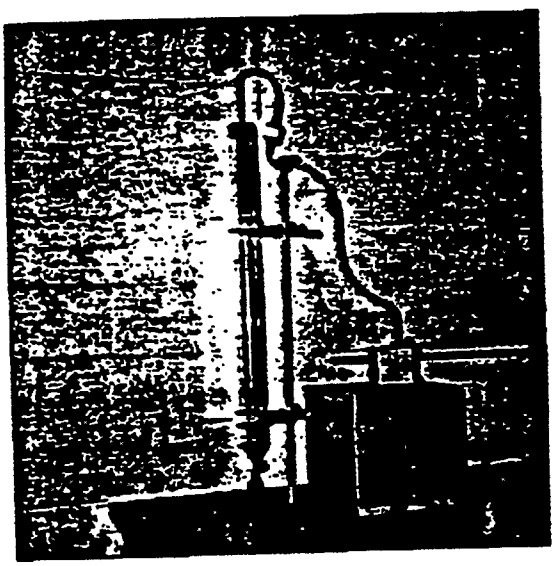


Figure #3

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