

Flow meter calibration

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Protocol saved on James's computer but originally from Sean

Sean's Edwards Flow Meter Calibration Procedure

Materials

Bubble-o-meter

Stop watch

Soap Glycerol Solution

Thermometer to accurately determine room temperature

Barometer, can read from white box or 6400

Excel spread sheet with H₂O Saturation Vapor Pressure table or equation

Procedure

1. First zero the flow meter. Do this with the flow meter under pressure but with the flow meter closed and/or the toggle valve in line after the flow meter closed. Use a small screw driver to adjust the pot on the flow meter itself or on the flow meter read out until it reads 0
2. Put a humidifier in line after the flow meter, but do not use a condenser.
We want to humidify the air as close to 100% (a dew point of room temperature) as we can. By setting the humidity at 100% (or close to it) we can eliminate most of the uncertainty of how much H₂O vapor the bubble is putting in to the gas stream. We will then subtract out the partial pressure of the water vapor later
3. Connect the output of the humidifier to the bubble-0-meter.
If possible use the bubble-o-meter with the smallest outlet. This will help minimize the effects of diffusion across the bubble especially when we are using oxygen, or 5% CO₂ in air or oxygen
4. Because the N₂ line makes a tee to the reference output just after it enters the mixing box, make sure that the reference output from the mixing box is capped so that we are measuring the entire flow from the N₂ flow controller.
5. Fill a pipette bulb up with a soap-glycerol solution and attach to flow meter
6. Set the Flow meter to a voltage or flow according to the spreadsheet
Make sure to calibrate flow meter with gas that it will actually control, i.e. don't calibrate the oxygen flow controller with nitrogen etc.
6. Carefully make a bubble and time with a stop watch how long it takes the bubble to travel a known volume, for maximum accuracy try to use a volume that takes between 5 and 30 seconds.
7. After recording your values, subtract out the volume due to water vapor and check for linearity and compare with results of previous calibrations (if available)

Soap Glycerol Solution, 250 ml

In a 250 ml Bottle

+ 200 ml H₂O

+ 25 ml liquid dish soap

+ 2.5 ml glycerol