Flow measuring devices essay sample

Environment, Water

The experiment covers the comparison among the four flow measuring instruments Rotameter, Water Level Indicator, Water Meter and V-notch). The experiment will discuss how each of the measuring devices works and how to use it.

II. OBJECTIVES:

* To gain knowledge of how flow measuring devices work.

* To study the concept behind the instruments.

* To compare the readings of flow measured among the instruments.

III. MATERIALS AND EQUIPMENT:

* Water Pipeline System (mounted with the measuring instruments) * Water

IV. SAFETY PRECAUTION/S:

* Observe the general safety precautions at all times.

* Do not handle the materials and equipment without the necessary PPE (gloves etc).

V. EXPERIMENT PROCEDURE:

1. Measure the height of the water in the reservoir. No water should be flowing out of the V-notch. Record the initial height. 2. Set the water flow by turning the system on. To adjust the flow, turn the valve on to the desired value with respect to the rotameter. (10L/min, 15 L/min, 20L/min, 25L/min and 30L/min) 3. The water is now flowing. Record the change in the height of the water in the reservoir. Wait for it to even out. 4. Make sure to pay attention on the water level indicator. Set a time of its reading. Example: at 12 seconds, it reads 2 liters. Then its reading is 2L/12s = 10L/min. Record the reading. 5. As you record readings. Have someone take the

measurement from the water meter. This procedure needs utter focus, I recommend taking a video of the water meter to ensure correct reading. To measure, get the initial value of the water meter then after a few seconds (10 or so) get the new reading.

By doing this you can compute for the change of the values then convert it to volumetric flow. 6. Make sure the values' units are all the same. I recommend Liters per Minute because Meter Cube per Second is hard to record and the values are very small. 7. Now you have 4 values. The rotameter standard, the change in height (which will be used in an equation), the water level indicator reading and the water meter reading. Make a table and compare their values. 8. To solve for the flow in the V-notch, measure the angle of the " V" and take the change in height. Substitute them to this equation: qactual = Cd8152gtan∅2h52 The angle is ∅ and the h is change in height minus the initial height, which is 3 cm.

Rotameter

A rotameter is a device that measures the flow rate of liquid or gas in a closed tube. It belongs to a class of meters called variable area meters, which measure flow rate by allowing the cross-sectional area the fluid travels through to vary, causing some measurable effect. A rotameter consists of a tapered tube, typically made of glass with a ' float', actually a shaped weight, inside that is pushed up by the drag force of the flow and pulled down by gravity. Drag force for a given fluid and float cross section is a function of flow speed squared only, see drag equation. A higher volumetric flow rate through a given area increases flow speed and drag force, so the

float will be pushed upwards. However, as the inside of the rotameter is cone shaped (widens), the area around the float through which the medium flows increases, the flow speed and drag force decrease until there is mechanical equilibrium with the float’s weight. Floats are made in many different shapes, with spheres and ellipsoids being the most common. The float may be diagonally grooved and partially colored so that it rotates axially as the fluid passes. This shows if the float is stuck since it will only rotate if it is free. Readings are usually taken at the top of the widest part of the float; the center for an ellipsoid, or the top for a cylinder. Some manufacturers use a different standard. The “ float” must not float in the fluid: it has to have a higher density than the fluid; otherwise it will float to the top even if there is no flow.

V-notch Measurement

The V-notch weir is a triangular channel section, used to measure small discharge values. The upper edge of the section is always above the water level, and so the channel is always triangular simplifying calculation of the cross-sectional area. V-notch weirs are preferred for low discharges as the head above the weir crest is more sensitive to changes in flow compared to rectangular weirs.

Water Level Indicator

The water level indicator in this experiment is more of like a graduated cylinder. It is connected to a water flow and it will measure by means for graduation. Water will rise inside the tube once there is a flow. It will then tell the measurements.

Water Meter

A water meter is a device used to measure the volume of water usage. In many developed countries water meters are used to measure the volume of water used by residential and commercial building that are supplied with water by a public water supply system. Water meters can also be used at the water source, well, or throughout a water system to determine flow through that portion of the system.

VII. CONCLUSION:

Different flow measuring devices/instruments are being used today to serve different purposes. The difference between the measurements of the instruments in the experiment may be due to the losses in the system and human error. In an actual measurement, differences like these are expected because unlike theoretical computations there are a lot of factors that affect the value of actual computations.

IX. REFERENCES

http://en. wikipedia. org/wiki/Weir#V-notch_weir

http://en. wikipedia. org/wiki/Water_meter

http://en. wikipedia. org/wiki/Rotameter