

JULY 2007
VIVA 5

How do you measure gas flow?

“Please define flow”

Flow is the quantity of fluid passing a point per unit time

“Please state the Hagen-Poiseuille equation”

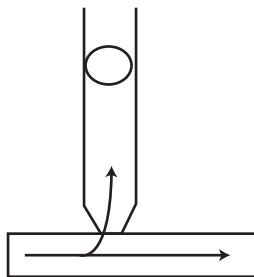
$$\text{Flow} = \frac{\Delta P \pi r^4}{8 n l}$$

n = viscosity
l = length
P = pressure
r = radius

“Do you know of any different ways that flow may be measured?”

Rotameter

is a fixed pressure variable orifice flowmeter
calibration is required, is gas specific
measured from the centre of the bobbin
inaccuracies due to static electricity and sticking

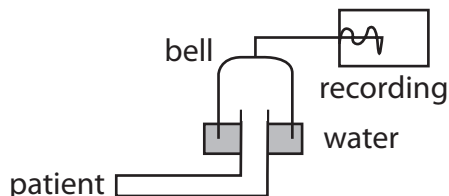


high flows turbulent
(density dependent)

low flows laminar
(viscosity dependent)

Benedict-Roth Spirometer

actually measures gas volumes (but because flow = volume/time)



Pneumotachograph

is a constant resistance, variable pressure flowmeter
across a screen gauze gas flows and there is a pressure drop which is recorded by transducer
flow = pressure change/resistance, and since resistance is constant, flow is derived

Wright's respirometer

has a weathervane like mechanism
is unidirectional
is only accurate to around 5-10% and varies with flow
can stick with water condensation