Name : ....

$\rightarrow V = \frac{152}{1000} = .152 L$

محلول

(1) A 125 mL Erlenmeyer flask has a measured volume of 152 mL. A 0.199 g sample of an unknown vapor occupies the flask at 98.7°C (T) and a pressure 754 torr (P). Assume ideal gas behavior.

a. How many moles of vapor are present?

* $P = 754$ torr $\rightarrow$ atm

1 atm $\rightarrow$ 760 torr $\rightarrow$ **P = .992 atm**

x $\rightarrow$ 754 torr

* $n = \frac{PV}{RT} = \frac{.992 * .152}{.08206 * 371.85}$

$n = \frac{.151}{30.5} = $ **.005 mol**

* $T = 98.7 + 273.15 = $ **371.85 K**

b. What is the molar mass of the vapor?

$n = \frac{m}{Mr} \rightarrow Mr = \frac{m}{n} = \frac{.199}{.005} = 39.8$ g/mol

$\rightarrow P = 1$ atm

(2). a. If the atmospheric pressure of the flask is assumed to be 760 torr in Question 1, what is the reported molar mass of the vapor?

* $n = \frac{PV}{RT} = \frac{1 * .152}{.08206 * 371.85} = \frac{.152}{30.5} = .00498$ mol

* $Mr = \frac{m}{n} = \frac{.199}{.00498} = 39.9$ g/mol

(b.) What is the percent error caused by the error in the recording of the pressure of the vapor?

مش داخل

$$\% \text{ error} = \frac{M_{difference}}{M_{actual}} \times 100 = \frac{39.9 - 39.8}{39.9} * 100\% = .25\%$$

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3. a. How the pressure of the vaporized liquid is determined in this experiment ? by the barometer in the laboratory.

b. How is the volume of vaporized liquid determined in the experiment? fill the erlenmeyer flask to the brim with water and insert the one-hole stopper, remove the stopper and measure the volume of the flask by transferring the water to a graduated cylinder

c. How is the temperature of vaporized liquid determined in the experiment ? after a water reaches a gentle boil the temperature is recorded with a thermometer

d. How is the mass of vaporized liquid determined in the experiment ?

mass of vapor = mass of dry flask, stopper and vapor ⊖ mass of dry flask and stopper

5. The molar mass of a compound is measured to be 43.7, 42.9, 43.3, and 43.0 in four trials.

a. What is the average molar mass of the compound?

average Mr $\bar{X}$ $= \frac{43.7 + 42.9 + 43.3 + 43.0}{4} = \frac{172.9}{4} = 43.225$ g/mol

b. Calculate the standard deviation (see Appendix B) for the determination of the molar mass.

	$x - \bar{x}$	$(x-\bar{x})^2$
43.7 →	$43.7 - 43.225 = .475$ →	$(.475)^2 = .226$
42.9 →	$42.9 - 43.225 = -.325$ →	$(-.325)^2 = .106$
43.3 →	$43.3 - 43.225 = .075$ →	$(.075)^2 = .006$
43.0 →	$43.0 - 43.225 = -.225$ →	$(-.225)^2 = .051$

$\Sigma(x-\bar{x})^2 = .389$

$\sigma = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}} = \sqrt{\frac{.389}{4-1}} = \sqrt{\frac{.389}{3}} = \sqrt{.1297} = .3601$

6. The ideal gas law equation (equation 3.4) is an equation used for analyzing "ideal gases". According to the kinetic molecular theory that defines an ideal gas, no ideal gases exit in nature, only "real" gases. Van der Waal's equation is an attempt to make corrections to real gases that don't exhibit ideal behavior. Describe the type of gases molecules that are most susceptible to nonideal behavior.

gases that are most susceptible to non ideal behaviour are those that have attractive and repulsive forcess among their molecules and whose particles have volume.