A student performs an experiment designed to determine the molar mass of a sample of an unknown volatile liquid. The following data was collected using 10.0 ml test tube (R=0.082 atm.L/mol.K):

| | |
|---|---|
| Mass of test tube and foil cover | 7.525 g |
| Temperature of water bath | 99.0 °C |
| Mass of test tube and foil and condensed gas | 7.545 g |
| Barometric pressure | 0.987 atm |

The molar mass of the volatile liquid is --------

- 61.84 g/mol
- 46.38 g/mol
- 77.30 g/mol
- 30.92 g/mol
- 92.75 g/mol

Clear my choice

[1] $$M \cdot W = \frac{m \cdot R \cdot T}{P \cdot V}$$

$$= \frac{(7.545 - 7.525) \cdot 0.082 \cdot (99 + 273.15)}{0.987 \cdot 0.01}$$

$$\simeq 61.84 \text{ g/mol}$$



Scanned with CamScanner

A student performs an experiment designed to determine the molar mass of a sample of an unknown volatile liquid. The following data was collected using 25.0 ml test tube (R=0.082 atm.L/mol.K):

Mass of test tube and foil cover 7.525 g

Temperature of water bath 99.0 °C

Mass of test tube and foil and condensed gas 7.625 g

Barometric pressure 0.987 atm

The density of the vapor is-------

- $5.00 \times 10^{-3}$ g/mL
- $6.66 \times 10^{-3}$ g/mL
- $4.00 \times 10^{-3}$ g/mL
- $1.00 \times 10^{-2}$ g/mL
- $3.33 \times 10^{-3}$ g/mL

[2] $M.w = \frac{(7.625 - 7.525) \cdot 0.082 \cdot (99+273)}{0.987 \times 0.025} = 123.6\ g/mol$

$D = \frac{P.M.w}{R.T} = \frac{0.987 \cdot 123.6}{0.082(99+273)} = 4.0\ g/L = 4 \times 10^{-3}\ g/m$



Scanned with CamScanner

The mass of an unknown volatile liquid was found to be 0.20 g at STP (in gas phase). If the molar mass of this substance is 17 g/mol; then the volume of this amount at the same conditions is:

- 175 mL
- 264 mL
- 245 mL
- 329 mL
- 140 mL

Next page

[3] at stp: $p = 1 atm$

$T = 273K$

$$V = \frac{m \cdot R \cdot T}{P \cdot M \cdot W} = \frac{0.20 * 0.082 \cdot 273}{1 * 17}$$

$$= 0.263 \ L = 263 \ ml$$



Scanned with CamScanner

If 0.42 g of an unknown gas were collected from a reaction in a 380.0 ml vessel at 20.0 °C and a pressure of 720 mmHg, then the unknown gas could be [R = 0.082 atm.L/mol.K]

- $NH_3$ (Molar mass: 17 g/mol)
- $N_2$ (Molar mass: 28 g/mol)
- $SO_2$ (Molar mass: 64 g/mol)
- $Cl_2$ (Molar mass: 71 g/mol)
- $CO_2$ (Molar mass: 44 g/mol)

Next page

[4] $M.w = \dfrac{0.42 \cdot 0.082 \cdot (20 + 273)}{(720/760) \cdot 0.38}$

$= 28.0 \text{ g/mol}$

A student performs an experiment designed to determine the molar mass of a sample of an unknown volatile liquid. The following data was collected using 30.0 ml test tube (R=0.082 atm.L/mol.K):

| | |
|---|---|
| Mass of test tube and foil cover | 7.525 g |
| Temperature of water bath | 99.0 °C |
| Mass of test tube and foil and condensed gas | 7.625 g |
| Barometric pressure | 0.987 atm |

The density of the vapor is-------

- $3.33 \times 10^{-3}$ g/mL
- $1.00 \times 10^{-2}$ g/mL
- $6.66 \times 10^{-3}$ g/mL
- $4.00 \times 10^{-3}$ g/mL
- $5.00 \times 10^{-3}$ g/mL

Clear my choice

Next page

[5] $$M.w = \frac{(7.625 - 7.525) \cdot 0.082 \cdot (99+273)}{0.987 \cdot 0.03}$$

$$= 103.0 \text{ g/mol}$$

$$D = \frac{0.987 \times 10.3}{0.082 (99+273)} = 3.33 \times 10^{-3} \text{ g/ml}$$



Scanned with CamScanner