

Semana 10 - Gases: Resolução

Prof. Vogt

① $\frac{V_1}{T_1} = \frac{V_2}{T_2}$
 $\frac{15}{300} = \frac{20}{T_2}$
 $T_2 = 400\text{K}$
 $\therefore \Delta T = 100\text{K}$

② $PV = nRT$
 $2,3 \cdot 41 = n \cdot 0,082 \cdot 290$

$n = 5 \text{ mols}$

nº moléculas = $5 \cdot 6,02 \cdot 10^{23} \approx 3 \cdot 10^{24}$ moléculas

③ $P_1 V_1 = n_1 R T_1$
 $9,2 \cdot 60 = \frac{m_1}{32} \cdot 0,082 \cdot 300$

$m_1 = 718\text{g}$

$P_2 V_2 = n_2 R T_2$

$1 \cdot 60 = \frac{m_2}{32} \cdot 0,082 \cdot 300$

$m_2 = 78\text{g} \therefore \text{escapa } 640\text{g}$

④ $\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$
 $\frac{A \cdot h_1}{303} = \frac{A \cdot h_2}{333}$
 $h_2 \approx 1,1 h_1$
 \therefore aumenta 10%

⑤ $PV = \frac{m}{M} RT$
 $1 \cdot V = \frac{13000}{52} \cdot 0,082 \cdot 300$

$V = 6150\text{L} \approx 6,2\text{m}^3$

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⑥ $P = \frac{F}{A}$

$P = \frac{60}{12}$

$P = 5 \text{ kgf/cm}^2$

$P = 5 \text{ atm}$

$PV = nRT$
 $5 \cdot V = 5 \cdot 0,082 \cdot 300$

$V = 24,6\text{L}$

⑦ $P_1 V_1 = n_1 R T_1$
 $P \cdot V = n_1 \cdot R \cdot 250$

⑧ $P \cdot V = n_1 \cdot R \cdot 250$

$P_2 V_2 = n_2 R T_2$

⑨ $P \cdot V = n_2 R \cdot 400$

$\frac{PV}{n_2 R 400} = \frac{PV}{n_1 R 250}$

$n_2 = 0,625 n_1$

\therefore escapa $0,375 n_1$

⑩ $\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$

$(1 \cdot 10^5 + 10^3 \cdot 10 \cdot 0,7) \cdot 20 = 1 \cdot 10^5 \cdot V_2$

$V_2 = 21,4 \text{ mm}^3$

⑪ $P_1 V_1 = n_1 R T_1$
 $4,8 \cdot 4 = n_1 \cdot R T_1$
 $P_2 V_2 = n_2 R T_2$
 $2 \cdot A \cdot (4+6) = n_2 R T_2$

$\frac{4,8 \cdot 4}{2 \cdot 4 \cdot 10} = \frac{n_1 \cdot R T_1}{n_2 \cdot R T_2}$

$n_1 = 0,8 n_2$

⑫ $P_1 V_1 = P_2 V_2$
 $1 \cdot 10^5 \cdot A \cdot 1 = \left(1 \cdot 10^5 + \frac{m \cdot 10}{20 \cdot 10^4} \right) \cdot A \cdot 0,8$

$m = 5 \text{ kg}$

Extras

1.

$P_{\text{gás}} = P_{\text{atm}} + P_{\text{pino}}$

$P_{\text{gás}} = 1 \cdot 10^5 + (60 \cdot 10^{-3} \cdot 10) / \pi \cdot (1,4 \cdot 10^{-3})^2$

$P_{\text{gás}} = 1 \cdot 10^5 + 1,02 \cdot 10^5$

$P_{\text{gás}} = 2,02 \cdot 10^5 \text{ Pa}$

② $n_f = n_1 + n_2$

$\frac{P_f V_f}{R T_f} = \frac{P_1 V_1}{R T_1} + \frac{P_2 V_2}{R T_2}$

$10 \cdot 10 = 1 \cdot 10 + 1 \cdot V_2$

$V_2 = 90 \text{ m}^3$

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3.

Estado inicial (0):

P_0
 V_0
 T_0

Transformação I: isobárica

$V_0 / T_0 = V_1 / T_1$
 $V_0 / T_0 = 3 \cdot V_0 / T_1$
 $T_1 = 3 \cdot T_0$

Estado (1):

$P_1 = P_0$
 $V_1 = 3 \cdot V_0$
 $T_1 = 3 \cdot T_0$

Transformação II: isocórica

$P_1 / T_1 = P_2 / T_2$
 $P_0 / 3 \cdot T_0 = (P_0/2) / T_2$
 $T_2 = 3 \cdot T_0/2$

Estado (2):

$P_2 = P_0/2$
 $V_2 = 3 \cdot V_0$
 $T_2 = 3 \cdot T_0/2$

Transformação III: isotérmica

$P_2 \cdot V_2 = P_3 \cdot V_3$
 $(P_0/2) \cdot 3 \cdot V_0 = P_0 \cdot V_3$
 $V_3 = 3 \cdot V_0/2$

Estado (3):

$P_3 = P_0$
 $V_3 = 3 \cdot V_0/2$
 $T_3 = 3 \cdot T_0/2$

Portanto os gráficos ficam:

