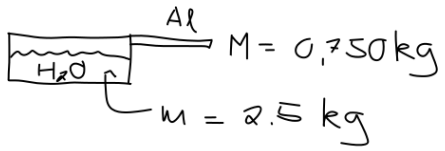
Dæmi 1, (11-01-74)



$T_i = 30,0°C$

$T_f = 100,0°C$

+ uppgufun

a) Orka Q — Tafla 1.3

$C_{H_2O} = 4186 \frac{J}{kg°C}$ nálgun, ekki alveg fasti á þessu T-bili

$C_{Al} = 900 \frac{J}{kg°C}$

$$Q_{suða} \simeq \{mC_{H_2O} + MC_{Al}\}\Delta T$$

b) Ef hitarinn er 500 W, hve langan tíma þarf?

$$P \cdot \Delta t = Q_T \rightarrow \Delta t = \frac{Q_T}{P}$$

$$\Delta t = \frac{6.42 \cdot 10^6 \text{ J}}{500 \text{ J/s}} = 1,28 \cdot 10^4 \text{ s}$$

$\simeq$ 3hr og 34 mín

Uppgufun $(L_v)_{H_2O} = 2256 \frac{kJ}{kg}$

$$Q_T = Q_{suða} + Q_v \quad , \quad Q_v = m(L_v)_{H_2O}$$

$$Q_T = \{mC_{H_2O} + MC_{Al}\}(T_f - T_i) + m(L_v)_{H_2O}$$

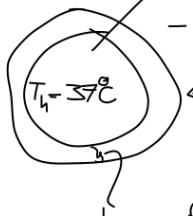
$$= \left\{2,5 \text{kg} \cdot 4186 \frac{J}{kgK} + 0,750 \text{kg} \cdot 900 \frac{J}{kgK}\right\} 70 \text{K}$$

$$+ 2,5 \text{kg} \cdot 2256 \cdot 10^3 \frac{J}{kg} \simeq 6,42 \text{ MJ}$$

Dæmi 2, (11-01-96)

Hver er meðalþykkt spíks?

Rostungur



$k = 0,2 \frac{W}{m^2 °C}$

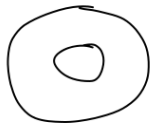
$$P = \frac{dQ}{dt} = \frac{kA(T_h - T_c)}{d}$$

$$d = \frac{kA(T_h - T_c)}{P} = \frac{0,2 \cdot 2,00 \cdot 38}{150} \text{ m} \simeq 0,10 \text{ m}$$

$= 10$ cm

Dæmi 3, (11-02-34)

a) p_{gauge} í dekki?, $T = 25°C$



með 3,60 mol gasi $= n$

í $V = 30,0\ L$

$$pV = nRT \rightarrow p = \frac{nRT}{V}$$

$$p = \frac{3,60\,mol \cdot 0,0821\,\frac{L \cdot atm}{mol \cdot K}\,(273+25)K}{30,0\,L}$$

$$\simeq 2,94\ atm \rightarrow p_{gauge} = 1,94\ atm$$

b) Finna p ef bætt er við 1,00 L gass sem var í 1 atm og 25°C

Gera ráð fyrir $\Delta T = 0$, $\Delta V = 0$

bæta við 1L → $p_0 = 1\,atm$, $\delta V = 1\,L$

$$\rightarrow \Delta n = \frac{p_0 \delta V}{RT}$$

$$p = \frac{(n+\Delta n)}{V} RT = \frac{\left(n + \frac{p_0 \delta V}{RT}\right) RT}{V}$$

$$= \frac{nRT}{V} + \Delta p, \quad \Delta p = \frac{p_0 \delta V}{V}$$

$$\Delta p = \frac{1\,atm\,1\,L}{30\,L} \simeq 0,033\ atm$$

Dæmi 4, (11-02-46) Escape velocity $v_{esc} = 11,1\ km/s$

$$M_{O_2} = 32,0\ \frac{g}{mol} = \frac{0,032\,kg}{mol}$$

fyrir hvaða T er $v_{esc} = v_{rms}$

$$v_{rms} = \sqrt{\frac{3RT}{M}} \rightarrow v_{esc}^2 = \frac{3RT_{esc}}{M_{O_2}}$$

$$\rightarrow T_{esc} = v_{esc}^2 \cdot \frac{M_{O_2}}{3R} = \left(11,1 \cdot 10^3\ m/s\right)^2 \frac{0,032\,\frac{kg}{mol}}{3 \cdot 8,31\,\frac{J}{mol\,K}}$$

$$\simeq 1,58 \cdot 10^5\,K$$