P #50

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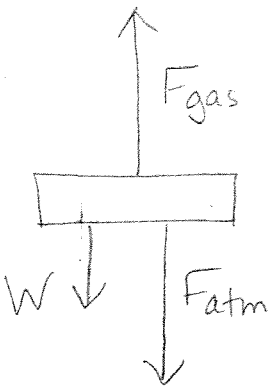
$T = 500\,K$
$n = 3.0\,mol$

$A = .050\,m^2$
$m = 5.0\,kg$

$P_{atm} = 1.013 \times 10^5\,Pa$



$F_{net} = 0$

Force for gas & atmosphere: $P = \frac{F}{A}$ so $F = P \cdot A$

$$W + F_{atm} = F_{gas}$$

$$m \cdot g + P_{atm} \cdot A = P_{gas} \cdot A$$

$$(5.0\,kg)(9.8\,m/s^2) + (1.013 \times 10^5\,Pa)(.05\,m^2) = P_{gas} \cdot (.05\,m^2)$$

$$P_{gas} = 1.02 \times 10^5\,Pa$$

$$P_{gas} V = n \cdot R \cdot T$$

$$(1.02 \times 10^5\,Pa) \cdot V = (3.0\,mol) \cdot (8.31\,J/mol \cdot K)(500\,K)$$

$$V = .122\,m^3$$

$$V = A \cdot h$$

$$.122\,m^3 = (.050\,m^2) \cdot h$$

$$\boxed{h = 2.4\,m}$$