56. The fact that they rotate but do not oscillate means that the value of f given in Table 20-3 is relevant. In §20-11, it is noted that $\gamma = C_p/C_V$ so that we find $\gamma = 7/5$ in this case. In the state described in the problem, the volume is

$$V = \frac{nRT}{p} = \frac{(2.0\,\text{mol})\left(8.31\,\frac{\text{J}}{\text{mol}\cdot\text{K}}\right)(300\,\text{K})}{1.01\times 10^5\,\text{N/m}^2}$$

which yields $V = 0.049\ \text{m}^3$. Consequently,

$$pV^\gamma = \left(1.01\times 10^5\,\text{N/m}^2\right)\left(0.049\,\text{m}^3\right)^{1.4} = 1.5\times 10^3\ \text{N}\cdot\text{m}^{2.2}\ .$$