$$pV^k = C$$

$$p = \frac{C}{V^k}$$

$$W = \int_{V_1}^{V_2} p\,dV = \int_{V_1}^{V_2} \frac{\text{constant}}{V^k}\,dV = \text{constant}\int_{V_1}^{V_2} V^{-k}\,dV$$

~~constant~~

$$\text{constant}\left[\frac{V^{-k+1}}{-k+1}\right]_{V_1}^{V_2} = \text{constant}\left[\frac{V_2^{-k+1}}{-k+1} - \frac{V_1^{-k+1}}{-k+1}\right]$$

$$p_1 V_1^{\,k} = p_2 V_2^{\,k}$$

~~$W = p_1 V_1$~~

$$W = \frac{(p_2 V_2^{\,k})\,V_2^{\,1-k} - (p_1 V_1^{\,k})\,V_1^{\,1-k}}{1-k} = \frac{p_2 V_2 - p_1 V_1}{1-k}$$

Finding p_2: $p_2 = p_1\left(\frac{V_1}{V_2}\right)^n = 997\ \text{kPa}\left(\frac{10}{22}\right)^{1.4} = 330.6\ \text{kPa}$

$$W = \left[\frac{(330.6\ \text{kPa})(0.022\ \text{m}^3) - (896\ \text{kPa})(0.01\ \text{m}^3)}{1-1.4}\right]$$

$$W = \frac{-1.6868\ \text{kPa}\cdot\text{m}^3}{-0.4} = 4.217\ \text{kPa}\cdot\text{m}^3$$

$= 4.217\ \text{kJ}$