

{Problem 6.007}

 $\dot{m} = 1.2 \text{ [kg/s]}$ $T_1 = 50 \text{ [C]}$ $P_1 = 1.5 * \text{convert}(\text{MPa}, \text{kPa})$ $P_2 = 15 * \text{convert}(\text{MPa}, \text{kPa})$ $W_{\text{actual}} = 21 \text{ [kW]}$ $W_{\text{reversible}} = \dot{m} * v * (P_2 - P_1)$ {Work Required by a Reversible Pump: $W_{\text{reversible}} = 16.39 \text{ kW}$ } $v = \text{volume}(\text{Water}, T = T_1, P = P_1)$ $n = W_{\text{reversible}} / W_{\text{actual}}$ {Isentropic Efficiency: $n = 78.03\%$ }

SOLUTION

Unit Settings: SI C kPa kJ mass deg

 $\dot{m} = 1.2 \text{ [kg/s]}$ $P_2 = 15000 \text{ [kPa]}$ $W_{\text{actual}} = 21 \text{ [kW]}$ $n = 0.7803$ $T_1 = 50 \text{ [C]}$ $W_{\text{reversible}} = 16.39 \text{ [kW]}$ $P_1 = 1500 \text{ [kPa]}$ $v = 0.001011 \text{ [m}^3\text{/kg]}$

No unit problems were detected.

EES suggested units (shown in purple) for v .