Solution to: Quiz 2  
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Given: A closed rigid tank  
Initial Pressure \( P_1 = 1 \) Mpa  
Specific Volume \( v_1 = 0.23268 \) m\(^3\)/kg  

Final temperature \( T_2 = 165 \) °C

Solution:

From Table B.1.2, at 1 Mpa, the saturation temperature is 179.91 °C and \( v_g \) is 0.19444, while the given \( v_1 \) is 0.23268 m\(^3\)/kg (\( > v_g \)). Hence it is in Superheated state.

From Table B.1.4, at 1 MPa and \( v_1 = 0.23268 \) m\(^3\)/kg, \( T = 250 \) °C --------------------(1)

It is cooled to 165 °C. At this temperature, the \( v_f \) is 0.001108 m\(^3\)/kg and \( v_g \) is 0.27269 m\(^3\)/kg. Since it is a closed rigid tank the specific volume is constant.

\( v_f < v_1 < v_g \). Therefore, it is saturated state.

Hence the pressure is the saturation pressure. From Table B.1.2, the saturation pressure at 165 °C is, \( P_2 = 700.5 \) kPa. ------------------------------------------(2)

Quality,  
\[ x = \frac{(v_1 - v_f)}{v_{fg}} \]
\[ x = \frac{(0.23268 - 0.001108)}{0.27158} \]

\[ x = 0.853 \] ------------------------------------------(3)