

$\bar{m} = 32 \text{ kg/Kmol}$   $C_p = 0.917 \text{ kJ/kg}\cdot\text{K}$

$P = 3 \text{ bar}$

$V_1 = 0.01 \text{ m}^3$

$V_2 = 0.03 \text{ m}^3$

$T_1 = 17^\circ\text{C} = 290\text{K}$

$W = ?$   $Q = ?$

$W = -P \Delta v$   
 $= -3 \times 10^5 [V_2 - V_1]$   
 $= -3 \times 10^5 [0.02]$

$W = -6 \text{ kJ}$

$Q = \bar{m} C_p [T_2 - T_1]$

$P_1 V_1 = \bar{m} R T_1$   
 $R = \frac{R_u}{\bar{m}} = \frac{8314.5}{32}$   
 $R = 259.828$

$m = \frac{P_1 V_1}{R T_1} = 0.0398 \text{ kg}$

$C_p = 0.917$

$\frac{T_2}{T_1} = \frac{V_2}{V_1} \Rightarrow T_2 = \frac{V_2}{V_1} \cdot T_1$

$Q = 21.16 \text{ kJ}$

$T_2 = \frac{0.03}{0.01} \times 290 = 870$   
 $T_1 = 290$

3.5  $V_1 = 0.05 \text{ m}^3$   $\Delta u = 0$

$P_1 = 6.3 \text{ bar}$

$Q = W$

$P_2 = 1.05 \text{ bar}$

$W = P_1 V_1 \ln \left[ \frac{P_1}{P_2} \right]$

$Q = ?$   $Q = 56.44 \text{ kJ}$

3.4

$P = 7 \text{ bar}$   $T_1$

$W = -P(V_2 - V_1)$

$x = 0.9$

$Q = h_2 - h_1$

$T_2 = 200^\circ\text{C}$

$W = ?$

$Q = ?$

$T_1 = 164.96$   $P = 7 \text{ bar}$   $T_2 = 200^\circ\text{C}$   $h_i = h_f + x(h_g - h_f)$

$V_g = 0.27268$   $x = 0.9$   $h_f = 697$   $h_g = 2755$   $h_i = 2549.3$

$W = -P(V_2 - V_1)$

$Q = h_2 - h_1$

$V_i = V_f(1-x) + V_g \cdot x$

$V_f = 0.0011082$

$V_i =$

$V_i = \frac{V_f(1-x) + V_g \cdot x}{z}$

$V_g = 0.260428$

$h_f = 720.653$

$h_{fg} = 2047.21$

$h_i = h_f + x h_{fg}$

$Q = h_2 - h_1$

$Q = \left( \frac{m - v}{v - 1} \right) W$

$v > 0$   $m > 0$

$m < 0$