

M.S. 3.30

$\text{NH}_3$

$P = \text{const. } 2.5 \text{ bar}$

$T_1 = 30^\circ\text{C}$

$T_2 = T_{\text{sat}} \text{ saturate vapor}$

$w = ? \text{ kJ/kg}$

$$-W \int_{v_1}^{v_2} p \, dv = p \int_{v_1}^{v_2} dv = p(v_2 - v_1)$$

①  $p = 2.5 \text{ bar}$  and  $T_1 = 30^\circ\text{C} \Rightarrow v_1 = 0.57745 \text{ m}^3/\text{kg}$

②  $p_2 = 2.5 \text{ bar}$   $T_2 = T_{\text{sat}} \Rightarrow v_2 = v_g = 0.4821 \text{ m}^3/\text{kg}$

$$w = (2.5 \text{ bar}) \left( \frac{100,000 \text{ Pa}}{\text{bar}} \right) (.4821 - .57745 \text{ m}^3/\text{kg})$$

$$w = -23,837 \text{ J/kg}$$

$$w = -23.8 \text{ kJ/kg}$$