

## Problem 1

Given: - Ammonia undergoes a constant pressure process

-  $p = 2.5 \text{ bar}$

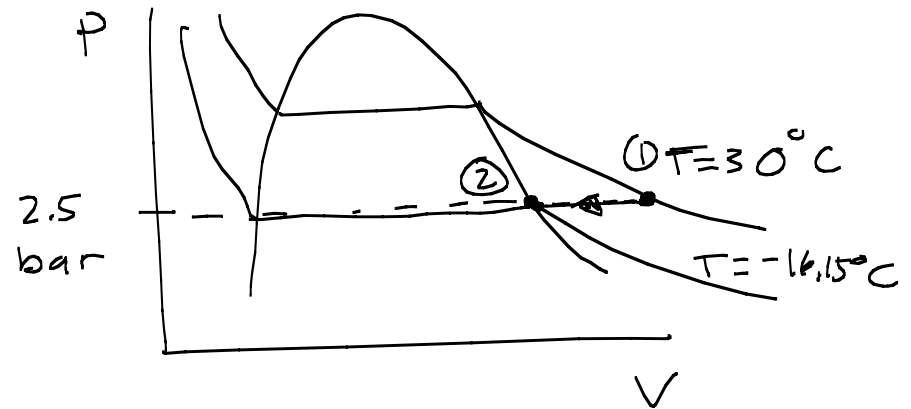
-  $T_1 = 30^\circ\text{C}$

- Process results in saturated vapor

Determine: The work for the process in  $\text{kJ/kg}$

Table A-14

@  $p = 2.5 \text{ bar}$ ,  $T_{\text{sat}} = -16.15^\circ\text{C}$



$$W = \int_{V_1}^{V_2} p dV = p (V_2 - V_1) = p (v_2 - v_1) \text{ (per kg)}$$

Table A-15

@  $p = 2.5 \text{ bar}$ ,  $T_1 = 30^\circ\text{C}$

$v_1 = 0.57745 \text{ m}^3/\text{kg}$

Table A-14 @  $p = 2.5 \text{ bar}$   $v_g = 0.4821 \text{ m}^3/\text{kg} = v_2$

$$W = \left( 2.5 \text{ bar} \left( \frac{10^5 \text{ Pa}}{1 \text{ bar}} \right) \right) (0.4821 \text{ m}^3/\text{kg} - 0.57745 \text{ m}^3/\text{kg})$$

$$W = -23,837.5 \text{ J/kg}$$

$$W = -23.84 \text{ kJ/kg}$$