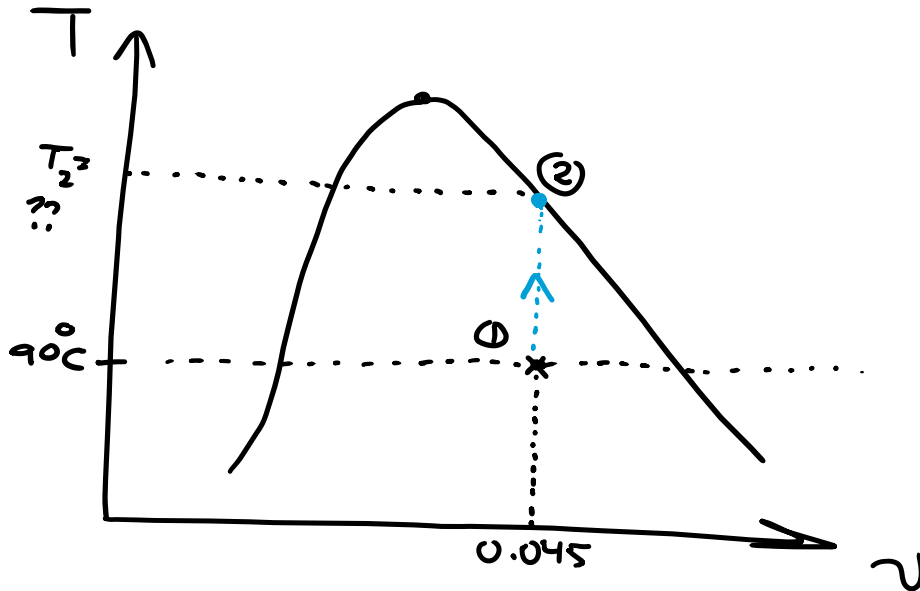


**3-50** A rigid tank with a volume of  $1.8 \text{ m}^3$  contains  $40 \text{ kg}$  of saturated liquid-vapor mixture of water at  $90^\circ\text{C}$ . Now the water is slowly heated. Determine the temperature at which the liquid in the tank is completely vaporized. Also, show the process on a  $T$ - $v$  diagram with respect to saturation lines. *Answer:  $256^\circ\text{C}$*



At state ①:  $v_1 = \frac{V_1}{m} = \frac{1.8}{40} = 0.045 \text{ m}^3/\text{kg}$

At state ②:  $v_2 = v_g = 0.045 \text{ m}^3/\text{kg} = v_1$  (rigid tank)

Go to Table A-4 and look for  $T$  that corresponds to  $v_g = 0.045 \text{ m}^3/\text{kg}$

We'll find the following:

$T$	...	$v_g$
$255^\circ\text{C}$		$0.045941$
$T_2$	$\dots \rightarrow$	$0.045$
$260^\circ\text{C}$		$0.042175$

By interpolation:

$$\frac{T_2 - 255}{260 - 255} = \frac{0.045 - 0.045941}{0.042175 - 0.045941}$$

$\rightarrow T_2 \approx 256^\circ\text{C}$