

Water is at a temperature and pressure of 30 °C and 0.042470 bar (abs), respectively. If the specific volume of the water is 10 m<sup>3</sup>/kg, determine the quality of the water at this state.

SOLUTION:

From the SLVM-temperature table, at  $T = 30\text{ }^{\circ}\text{C}$ ,  $p_{sat} = 0.042470\text{ bar (abs)}$ , which is the same pressure in the problem statement. Hence, the water must be in a saturated liquid vapor mixture (SLVM) phase. The quality of the water may be found from the specific volume. From the Saturated Water table at  $T = 30\text{ }^{\circ}\text{C}$ ,  $v_f = 0.0010044\text{ m}^3/\text{kg}$  and  $v_g = 32.878\text{ m}^3/\text{kg}$  (it's given that  $v = 10\text{ m}^3/\text{kg}$ ). Thus,

$$v = (1 - x)v_f + xv_g \Rightarrow x = \frac{v - v_f}{v_g - v_f}, \quad (1)$$

$$\boxed{x = 0.304}$$

