$$v_1 = 14.2\frac{ft^3}{lb_{da}}$$

$$T_2 = 92°F$$

$$\phi_2 = 75\%$$

$$h_2 = 49.23\frac{Btu}{lb}$$

Solve for the mass flow rate of air using the enthalpy values.

$$\dot{m} = \frac{\dot{Q}}{\Delta h} = \frac{\dot{Q}}{h_2 = h_1} = \frac{375,000\frac{Btu}{hr}}{49.23\frac{Btu}{lb} - 38.47\frac{Btu}{lb}} = 34,851\frac{lb}{hr}$$

Use the specific volume for State 1 to determine the volume flow rate in cfm.

$$\dot{V} = \dot{m}v_1 = \left(34,851\frac{lb}{hr}\right)\left(\frac{1hr}{60min}\right)\left(14.2\frac{ft^3}{lb}\right) = 8,248cfm$$

Answer C

45.27 What is the relative humidity of moist air at $6000ft$ above sea level with a dry bulb temperature of $70°F$ and a partial pressure of dry air of $11.5psia$?

A. 48%

B. 58%

C. 68%

D. 78%

Use the table Altitude Correction for Air to find the Density Factor at $6,000ft$ of elevation, and use it to determine the total pressure of moist air at that altitude.

$$DF = 0.801$$

$$p_t = (14.7psia)\,(0.801) = 11.78psia$$

The pressure of moist air is the sum of the pressure of partial pressure of water vapor in the air and the partial pressure of dry air. Since the partial pressure of dry air is given, subtract to find the partial pressure of water vapor.

$$p_w = p_t - p_{da} = 11.78psia - 11.5psia = 0.28psia$$

Use the steam table by searching Properties of Saturated Water organized by temperature and look up the saturation pressure at $70°F$. The saturation pressure is the maximum pressure water vapor can have at a given temperature.

$$p_{ws@70°F} = 0.36psia$$

Apply the definition of relative humidity, which is the actual partial pressure of water as compared to the saturatin pressure at that temperature.

$$\phi = \frac{p_w}{p_{ws}} = \frac{0.28psia}{0.36psia} = 78\%$$

Answer D