

$$\omega_m = (.7) \left( .01154 \frac{lb_w}{lb_{da}} \right) + (.3) \left( .0078 \frac{lb_w}{lb_{da}} \right) = .0104 \frac{lb_w}{lb_{da}}$$

Use the psychrometric chart once more to find the relative humidity for the mixed air condition which is now fully defined.

$$\phi_m = 68\%$$

**Answer D**

**41.16 At what temperature will moisture begin to condense out of atmospheric air being cooled from 200°F and 10% relative humidity?**

- A. 101°F
- B. 107°F
- C. 109°F
- D. 117°F

The temperature at which moisture will begin to condense out of air is called the Dew Point Temperature. See **dew-point temperature** in the reference handbook. Use the **high temperature psychrometric chart**. The condition is fully defined. Locate the state point, then follow horizontally to the left until reaching the saturation curve to read the dew point temperature.

$$T_{dp} \approx 107^\circ F$$

**Answer B**

**41.17 The combustion products from an industrial process are passed through a heat exchanger for energy recovery at 30psia. The humidity ratio is  $800 \frac{grains H_2O}{lb_{da}}$ . What is the dew point of the exhaust stream?**

- A. 130°F
- B. 140°F
- C. 150°F
- D. 160°F

Calculate the humidity ratio of the combustion products. Assume the products are similar to moist air i.e. the mixture is comprised of dry air and water vapor. There are 7,000 **grains of moisture** per pound of water.

$$\omega = \frac{800grains}{lb_{da}} \left( \frac{1lb_w}{7000grains} \right) = .1143 \frac{lb_w}{lb_{da}}$$