37.18 A kitchen contains lighting and cooking equipment which draws $30KW$. There is also a moisture load of $2\frac{lb}{min}$. What is the sensible heat ratio?

A. 0.02

B. 0.45

C. 0.55

D. 0.98

Change the units of the sensible heat load from KW to $\frac{Btu}{hr}$.

$$Q_S = (30KW)\left(\frac{3412\frac{Btu}{hr}}{KW}\right) = 102,360\frac{Btu}{hr}$$

Calculate the latent load. Use the steam table by looking up Properties of Saturated Water by temperature. Assume the kitchen is around $80°F$. Note the latent heat of vaporazation for steam, $h_{fg} \approx 1050\frac{Btu}{lb}$ at this approximate temperature.

$$Q_L = \dot{m}\Delta h = \dot{m}h_{fg} = \left(2\frac{lb}{min}\right)\left(1050\frac{Btu}{lb}\right)\left(\frac{60min}{1hr}\right) = 126,000\frac{Btu}{hr}$$

Find the Sensible Heat Ratio.

$$SHR = \frac{Q_S}{Q_T} = \frac{Q_S}{Q_S + Q_L} = \frac{102,360\frac{Btu}{hr}}{102,360\frac{Btu}{hr} + 126,000\frac{Btu}{hr}} = 0.448$$

Answer B