

11) Steam engine $T_H = 127^\circ\text{C} = 400\text{K}$ $T_C = 27^\circ\text{C} = 300\text{K}$

What is Q_C for $W = 2.0 \text{ kcal}$?

$$e = 1 - \frac{T_C}{T_H} = 1 - \frac{300}{400} = 0.25$$

$$e = \frac{W}{Q_H} \quad Q_H = \frac{W}{e} = \frac{2.0 \text{ kcal}}{0.25} = 8.0 \text{ kcal}$$

$$W = Q_H + Q_C \quad Q_C = W - Q_H = 2.0 \text{ kcal} - 8.0 \text{ kcal} = -6.0 \text{ kcal}$$

Heat discharged to compressor is 6.0 kcal (A)