

4. 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  $6.0\text{ kcal}$  (A)