Answer on Question #47768, Engineering, Other

A refrigerator has to transfer an average of 263J of heat per second from -10'C to 25'C.Calculate the average power consumed. Assume that the refrigerator is ideal?

Solution:

Given:

$Q_1 = 263$ J/s,

$T_1 = 263$ K

$T_2 = 298$ K,

$W =?$

Get coefficient of performance for a Carnot Heat Pump Cooler :

Carnot Heat Pump Cooler

$$COP = \frac{T_1}{T_2 - T_1} = \frac{263}{298 - 263} = 7.514$$

By definition :

$$COP = \frac{Q_1}{W}$$

$$W = \frac{Q_1}{COP} = \frac{263}{7.514} = 35 \text{ W}$$

Answer: $W = 35$ W.