

A heat pump is used to heat up a house in winter. The temperature inside the house is 22°C and outside of the house is -15°C . Find the maximum possible coefficient of performance of the heat pump.

Given:

Temperature inside the house:

$$T_H = 22^{\circ}\text{C} = 295\text{ K}$$

Temperature outside the house:

$$T_C = -15^{\circ}\text{C} = 258\text{ K}$$

To determine:

The maximum possible coefficient of performance of the heat pump COP_{\max}

Use formula:

$$\text{COP}_{\max} = T_H / (T_H - T_C) \text{-----(1)}$$

Substituting for T_H and T_C in (1):

$$\text{COP}_{\max} = 295 / (295 - 258) = 7.9$$