
Exercises

1. A 2-kg copper bar (not to be confused with the downtown Terre Haute watering hole) is initially at a temperature of $T_1 = 25^\circ\text{C}$. It is then heated at a constant rate for two minutes until the temperature is $T_2 = 80^\circ\text{C}$. If the specific heat of copper is $c = 385 \text{ J/kg}\cdot^\circ\text{C}$, find the rate of heat transfer into the copper in W .
2. The same copper bar is sandwiched between two isothermal walls maintained at constant temperatures. The bar is 15 cm long with a cross sectional area of 2 cm^2 . If the hotter of the two walls is 40°C and the thermal conductivity of copper is $k = 400 \text{ W/m}\cdot\text{K}$, find the temperature of the colder wall for the same rate of heat transfer as in Problem 1.
3. A solid wall is maintained at 50°C . Air at a temperature of 25°C with a convective heat transfer coefficient of $10 \text{ W/m}^2\cdot^\circ\text{C}$ blows past the wall at a velocity of 0.25 m/s . Find the rate of heat transfer from the wall to the air in W/m^2 .
4. The speed of the air blowing past the wall in Problem 3 is increased to 5.0 m/s . Find the new value of the heat transfer coefficient and the new rate of heat transfer.