(b) One end of a copper rod, with diameter 2.0 cm and length 50.0 cm, is in good thermal contact with a hot bath maintained at $100°C$ while the other end is immersed in a mixture of 200 g ice and 100 g water initially maintained at $0°C$ inside a container whose thermal capacity is negligible. Both the copper rod and the container are well-lagged. How long does it take for the temperature of the mixture to rise from $0°C$ to $20°C$?

[Thermal conductivity of copper $= 400\ \text{W m}^{-2}\ \text{K}^{-1}$;
Specific heat capacity of water $= 4200\ \text{J kg}^{-1}\text{K}^{-1}$
Latent heat of fusion of water $= 3.34 \times 10^{5}\ \text{J kg}^{-1}$] [6 marks]