Some small aluminum rivets of total mass 170g and at 100°C are emptied into a hole in a large block of ice at 0°C.
a) What will be the final temperature of the rivets?
b) How much ice will melt?
Please explain your answer

Specific heat of aluminum: $c_a = 930J/kg * K$, and heat of fusion of ice is: $\lambda_i = 335 * 10^3 J/kg$
As we have a large block of ice, the final temperature of the rivet is equal to the ice temperature = 0°C.
The rivet will give to ice energy:
$$Q = m_a c_a (T_2 - T_1)$$
This heat will melt ice:
$$Q = m_i \lambda_i \rightarrow m_i = \frac{Q}{\lambda_i}$$
$$m_i = \frac{m_a c_a (T_2 - T_1)}{\lambda_i} = \frac{0.17kg * 930J/kg \cdot K * 100K}{335 * 10^3 J/kg} = 0.047kg$$

Answer: $T_2 = 0°C$, $m_i = 0.047kg$