

90. We require $\sum Q = 0$ (which amounts to assuming the system is isolated). There are both temperature changes (with $Q = cm\Delta T$) and phase changes ($Q = L_F m$). Masses are in kilograms and heat in Joules, with temperatures measured on the Celsius scale. We refer to the ice (which melts and becomes (liquid) water) as H_2O to avoid confusion; note that it involves *three* terms. The ice has mass m and the tea has a 1.0 kg mass (the density of tea is taken to be the same as the density of water $\rho_w = 1000 \text{ kg/m}^3 = 1.0 \text{ kg/L}$).

$$\begin{aligned} Q_{\text{H}_2\text{O}} + Q_{\text{tea}} &= 0 \\ (2220)m(10^\circ) + (333000)m + (4190)m(10^\circ) + (4190)(1.0)(10^\circ - 90^\circ) &= 0 \\ 397100m - 335200 &= 0 \end{aligned}$$

Therefore, $m = 0.84 \text{ kg}$ which amounts to *forty-two* 20 g ice cubes.