

Homework 17.1

4. 3.5 kJ of heat are added to a 28.2 g sample of iron at 20 degrees Celsius. What is the final temperature of the iron in Kelvin. See text for specific heat of iron.

Given :

$$q = 3.5 \text{ kJ} = 3500 \text{ J}$$

$$m = 28.2 \text{ g}$$

$$\text{Fe} : C_p = \frac{0.449 \text{ J}}{\text{g} \times \text{K}}$$

$$T_1 = 20^\circ \text{C} + 273.15 = 293.15 \text{ K}$$

$$q = C_p \times m \times \Delta T$$

$$\frac{q}{C_p \times m} = \Delta T = (T_2 - T_1) = (T_2 - 293.15 \text{ K})$$

$$\frac{3500 \text{ J}}{1} \times \frac{\text{g} \times \text{K}}{0.449 \text{ J}} \times \frac{1}{28.2 \text{ g}} = (T_2 - 293.15 \text{ K})$$

$$276.46 \text{ K} = (T_2 - 293.15 \text{ K})$$

$$276.46 \text{ K} + 293.15 \text{ K} = T_2$$

$$569.61 \text{ K} = T_2$$

$$570 \text{ K} = T_2$$