

17.36. Model: Each car's kinetic energy is transformed into thermal energy.

Solve: For each car,

$$K = \frac{1}{2} Mv^2 = \Delta E_{\text{th}} = Mc_{\text{car}} \Delta T \Rightarrow \Delta T = \frac{v^2}{2c_{\text{car}}}$$

Assume $c_{\text{car}} = c_{\text{iron}}$. The speed of the car is

$$v = 80 \text{ km/hr} = \frac{80 \times 1000 \text{ m}}{3600 \text{ s}} = 22.22 \text{ m/s} \Rightarrow \Delta T = \frac{(22.22 \text{ m/s})^2}{2(449 \text{ J/kg K})} = 0.55^\circ\text{C}$$