

Answer on the question #65653, Chemistry / General Chemistry

Question:

An electric heater supplies 45.4 joules of energy to 28.2-g sample of KCl originally at 37.4 °C. Compute the final temperature (in °C).

Solution:

The change in temperature ($T_2 - T_1$) of the substance of the mass m after absorption of certain amount of energy Q can be calculated using the specific heat c of this substance:

$$Q = cm(T_2 - T_1)$$

$$T_2 = \frac{Q}{cm} + T_1$$

Specific heat of KCl is 0.69694 J/(g °C). Then, final temperature T_2 is:

$$T_2 = \frac{45.4(J)}{696.5 \cdot 10^{-3}(J g^{-1} \text{ } ^\circ\text{C}^{-1}) \cdot 28.2 \cdot 10^{-3}(g)} + 37.4 \text{ } ^\circ\text{C}$$

$$T_2 = 39.7 \text{ } ^\circ\text{C}$$

Answer: 39.7 °C

The heat capacity data was taken from NIST chemistry webbook:

<http://webbook.nist.gov/cgi/cbook.cgi?ID=C7447407&Mask=2#Thermo-Condensed>

Answer provided by <https://www.AssignmentExpert.com>