Answer on Question#64510 – Chemistry – General chemistry

Question: Calculate the final temperature of 245 mL of water initially at 32 °C upon absorption of 17 kJ of heat.

Solution:

m = V·ρ;

m (water) = 245 ml · 1 $\frac{g}{ml}$ = 245 g.

17 kJ = 17·10^3 J.

The specific heat capacity of water is $c_p = 4.18\ \frac{J}{g\cdot^\circ C}$.

q = m·c_p·ΔT, where q is quantity of heat.

$$\Delta T = \frac{q}{m \cdot c_p} = \frac{17 \cdot 10^3 J}{245 g \cdot 4.18 \frac{J}{g°C}} = 16.6°\text{C};$$

$T_{final} = T_{initial} + \Delta T = 32°\text{C} + 16.6°\text{C} = 48.6°\text{C}$.

Answer: The final temperature is 48.6°C.