

Answer on the question #61941, Chemistry / General chemistry

Question:

The specific heat of a certain type of cooking oil is 1.75 J/(g°C). How much heat energy needed to raise the temperature of 2.02 kg of this oil from 23 degrees C to 191 degrees C?

Answer:

The heat energy can be calculate like integral:

$$U = \int_{T_1}^{T_2} C dT = C_{oil} \cdot (T_2 - T_1)$$

The specific heat of 1 g of a cooking oil is 1.75, and for 2.02 kg is:

$$C_{oil} = m \cdot C = 2.02 \text{ kg} \cdot 1000 \cdot 1.75 \text{ J/g} \cdot ^\circ\text{C} = 3535 \text{ J/}^\circ\text{C} = 3.54 \text{ kJ/}^\circ\text{C}$$

The heat energy needed:

$$U = 3.54 \text{ kJ/}^\circ\text{C} \cdot (191 - 23)^\circ\text{C} = 593.88 \text{ kJ}$$