

Answer on Question #68284 - Chemistry - General Chemistry

Question: A Meteorite falls from the sky and lands in a kiddie pool. The meteorite transfers 14.45×10^8 joules of heat energy to the water. If the pool heats up by only 0.5°C , what is the volume of the pool?

Solution

The amount of heat transferred to the matter is associated with the temperature change by the equation

$$Q = C * m * \Delta T,$$

Where Q is the amount of heat, C is the heat capacity, m is the mass and ΔT is the temperature change. The heat capacity of water is $4.187 \text{ kJ/kg}\cdot\text{K}$. We can also convert joules into kilojoules ($14.45 \times 10^8 \text{ J} = 14.45 \times 10^5 \text{ kJ}$) to simplify our calculations and find the mass of water in kilograms. This mass will be equal to the volume of the pool in liters as we assume that the density of water is 1 g/cm^3 . So, the mass of the water is

$$m = \frac{Q}{C * \Delta T} = \frac{14.45 * 10^5}{4.187 * 0.5} \approx 690231.67 \text{ kg}.$$

So, the volume of the pool is 690231.67 liters.

Answer: the volume of the pool is 690231.67 liters.

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