Answer on Question #69792-Physics-Molecular Physics | Thermodynamics

An electric geyser is used to heat 5l of water from 13℃ to 83℃ .If the heat lost in radiatin is 40 kj and water equivalent of geyser is 100 g. Determine the efficiency of the geyser . Take specific heat of water as 4200 J/kg.k°.

Solution

$$m = 5\ L = 5\ kg.$$

$$\Delta t = 83 - 13 = 70\ K.$$

Total mass:

$$M = 5 + 0.1 = 5.1\ kg.$$

Heat required:

$$Q = mc\Delta t = (4200)(5.1)(70) = 1.4994 \cdot 10^6\ J.$$

The efficiency of the geyser:

$$\eta = \frac{1.4994 \cdot 10^6 - 40 \cdot 10^3}{1.4994 \cdot 10^6} = 0.9733\ or\ 97.33\%.$$