

What is the power rating of a heater that changes 45.0 liters of water at 17.0° C in a 15.0 kg glass fish tank to 22.0° C in 3.5 hours?

What is the power rating of a heater that changes 45.0 liters of water at 17.0° C in a 15.0 kg glass fish tank to 22.0° C in 3.5 hours?

1 liter of H₂O = 1 kg of mass

$$P = W/t, \text{ or } P = E/t, \text{ or } P = Q/t$$

What gains TE?...both the water and the glass

$$P = (mc\Delta t_y + mc\Delta t_s)/t$$

$$P = ((45.0 \text{ kg} \times 4180 \text{ J/kg C} \times 5.0^\circ \text{ C}) + (15.0 \text{ kg} \times 664 \text{ J/kg C} \times 5.0^\circ \text{ C}))/12600 \text{ s}$$

$$P = 79 \text{ W}$$