

An electric device, which heats water by immersing a resistance wire in the water, generates 3000 J of heat per minute when an electric potential difference of 12 V is placed across its ends. What is the resistance of the heater wire?

$$P = \frac{\text{Energy}}{\text{time}} = \frac{3000 \text{ J}}{60 \text{ sec}} = 50 \text{ W}$$

$$P = \frac{V^2}{R} \Rightarrow R = \frac{V^2}{P} = \frac{(12)^2}{50} = \boxed{2.88 \Omega}$$