Science

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Question 1:

Why does the cord of an electric heater not glow while the heating element does?

Answer 1:

The heating element of an electric heater is a resistor. According to Joule's law of heating, the amount of heat produced by it is proportional to its resistance.

$$H = I^2 R t$$

The resistance of the element of an electric heater is very high. As current flows through the heating element, it becomes too hot and glows red. On the other hand, the resistance of the cord is low. It does not become red when current flows through it.

Question 2:

Compute the heat generated while transferring 96000 coulomb of charge in one hour through a potential difference of 50 V.

Answer 2:

According to Joule's law of heating, the amount of heat produced is given by

$$H = VIt$$

Where, V = 50 V

$$I = \frac{Charge}{time} = \frac{9600\ coulomb}{1\ hr} = \frac{9600}{60 \times 60} = \frac{80}{3}\ A$$

and t = 1 hour = 60×60 seconds

So,

$$H = 50 \times \frac{80}{3} \times 60 \times 60$$

$$= 4800000 I = 4.8 \times 10^6 I$$

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Question 3:

An electric iron of resistance 20 Ω takes a current of 5 A. Calculate the heat developed in 30 s.

Answer 3:

According to Joule's law of heating, the amount of heat produced is given by

H = VIt

Where, $V = IR = 5A \times 20 \Omega = 100 V$

I = 5 A

and t = 30 seconds

So,

 $H = 100 \times 5 \times 30 J$ = 15000 J = 1.5 × 10⁴ J

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