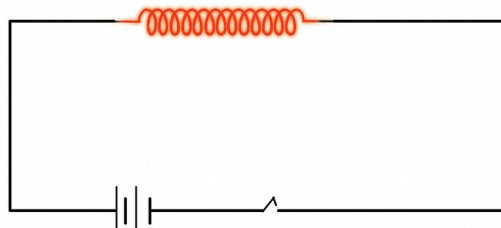


PHYSICS - X-PART-4 CLASS 04



Heating effect of electric current

\* When electricity passes through any conductor, it generates heat energy.



One volt

\* The potential difference between two points will be one volt if one joule of work is done in moving one coulomb of charge from one point to the other.

Joule Heating or Ohmic Heating.

\* Heat is developed in a circuit on passing current through it is known as the Joule Heating or Ohmic Heating.

\* What are the factors influencing the heat developed when a current passes through a conductor?

- 1.Intensity of electric current (I)
- 2.Resistance of the conductor (R)
- 3.The time of flow of current (t)

JOULE’S LAW

**Joule's Law**

The heat generated (H) in a current carrying conductor is directly proportional to the product of the square of the current (I) in the conductor, the resistance of the conductor (R) and the time (t) of flow of current.

$$H \propto I^2Rt \quad \therefore H = I^2Rt \text{ joule}$$

I is the current in ampere, R is the resistance in ohm and t is the time in second.

\*Joule’s Law is useful in devices that make use of heating effect of electricity.

$H = I^2Rt$  is used to find out the heat developed when current flows through a conductor. Let’s try to write down the equation in some other forms.

$H = I^2Rt$ $H = VIt$ $H = (V^2/R)t$
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- H – Heat energy
- R - Resistance
- V – Potential difference
- I – Current
- t - Time

Assignment

\* Complete the following table on the basis of Joule’s Law.

Resistance of conductor R (Ω)	Intensity of Current I (A)	Time for which current flows t (s)	Heat generated $I^2Rt$ (J)	Change in Heat (H)
2 R	I	t	2 $I^2Rt$	Twice (2H)
R	2 I	t	.....	.....
R/2	I	t	.....	.....
R	I/2	t	.....	.....
R	I	2t	.....	.....
R	I	t/2	.....	.....

\* Analyse the table and find out the factor that influences heat the most.