

Class XI, Thermal Radiation

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NEWTON'S LAW OF COOLING

$$\begin{array}{ccc} \text{at } t=0 & & \text{at } t=t \\ \boxed{T_i} & \xrightarrow{\text{cooling}} & \boxed{T} \\ T_0 & & T_0 \\ T_0 < T_i & & \end{array}$$

"Rate of cooling of a hot body is directly proportional to the temperature difference between the body and its surrounding, provided this difference in temp. is small."

$$-\frac{dQ}{dt} \propto (T - T_0)$$

$$\text{or } -\frac{dQ}{dt} = k(T - T_0) \Rightarrow \frac{dQ}{dt} = -k(T - T_0) \text{---(1)}$$

$$\therefore dQ = ms dT, \text{ by Eq (1)}$$

$$ms \frac{dT}{dt} = -k(T - T_0) \text{---(2)}$$

$\left| \frac{dT}{dt} \right|$ = rate of change of Temp of the body.