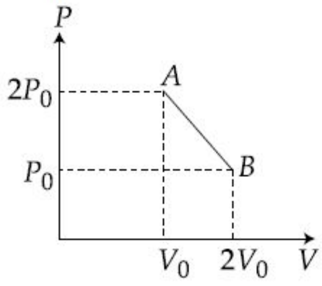
'n' moles of an ideal gas undergoes a process $A \to B$ as shown in the figure. The maximum temperature of the gas during the process will be :



(1) $\frac{9 P_0 V_0}{4nR}$

(2) $\frac{3 P_0 V_0}{2nR}$

(3) $\frac{9 P_0 V_0}{2nR}$

(4) $\frac{9 P_0 V_0}{nR}$

Based on JEE Main 2016

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$$P - 2P_0 = \frac{P_0 - 2P_0}{2V_0 - V_0}(V - V_0)$$

$$\therefore PV_0 - 2P_0V_0 = -P_0V + P_0V_0$$

$$\therefore P = \frac{P_0}{V_0}(3V_0 - V)$$

$$\therefore P \propto 3V_0 - V$$

Since PV=nRT, T is max. when PV is max.

$$PV \propto 3V_0V - V^2$$

Let, $f(V) = 3V_0V - V^2$

For maxima, $f'(V) = 3V_0 - 2V = 0$

Or, $V = \frac{3V_0}{2}$

f''(V) < 0 confirming maxima

$$T = \frac{PV}{nR} = \frac{\frac{P_0}{V_0}(3V_0 - V)V}{nR}$$

$$T = \frac{\frac{P_0}{V_0}\left(3V_0 - \frac{3V_0}{2}\right)\frac{3V_0}{2}}{nR} = \frac{9P_0V_0}{4nR}$$

Hence, Option (1).