

Previous Year JEE question 1

A mono-atomic ideal gas undergoes a process in which the ratio of P to V at any instant is constant and equals to 1. What is the molar heat capacity of the gas

- (a) $\frac{3R}{2}$ (b) $2R$ (2006 - 3M; -1)
(c) 0 (d) $\frac{5R}{2}$

- (b) In general, the molar heat capacity for any process is given by

$$C = C_v + \frac{R}{1-n}, \text{ when } PV^n = \text{constant}$$

$$\text{Here } \frac{P}{V} = 1, \text{ i.e. } PV^{-1} = \text{constant}$$

$$\text{For monoatomic gas, } C_v = \frac{3}{2}R$$

$$\therefore C = \frac{3}{2}R + \frac{R}{1-(-1)} = \frac{3}{2}R + \frac{R}{2} = \frac{4R}{2} = 2R.$$