

**Question 5**

The rms velocity of hydrogen is  $\sqrt{7}$  times the rms velocity of nitrogen. If  $T$  is the temperature of the gas, then

(2000S)

- (a)  $T(\text{H}_2) = T(\text{N}_2)$                       (b)  $T(\text{H}_2) > T(\text{N}_2)$   
(c)  $T(\text{H}_2) < T(\text{N}_2)$                       (d)  $T(\text{H}_2) = \sqrt{7} T(\text{N}_2)$

(c) **TIPS/Formulae :**

$$U_{\text{rms}} = \sqrt{\frac{3RT}{M}} \Rightarrow \sqrt{\frac{3RT_{\text{H}_2}}{2}} = \sqrt{7} \sqrt{\frac{3RT_{\text{N}_2}}{28}} ;$$

$$\therefore T_{\text{N}_2} = 2T_{\text{H}_2} \text{ or } T_{\text{N}_2} > T_{\text{H}_2}$$