12) Given $E_a = 31.05 \times 10^{-21}$ J

For T = 300K $\quad \langle K_{tr} \rangle = \frac{3}{2}(1.381 \times 10^{-23}\ J/K) \times 300K$ $\qquad \frac{E_a}{\langle K_{300} \rangle} = \frac{31.05}{6.2145} = 5$

$= 6.2145 \times 10^{-21}$ J

For T = 375K $\quad \langle K_{tr} \rangle = \frac{3}{2}(1.381 \times 10^{-23}\ J/K) \times 375K$ $\qquad \frac{E_a}{\langle K_{375} \rangle} = \frac{31.05}{7.7681} = 4$

$= 7.7681 \times 10^{-21}$ J

$$E_a = 5 \langle K_{300} \rangle = 4 \langle K_{375} \rangle$$

From table

Fraction of molecules with energies $> E_a = 5 \langle K_{tr} \rangle$ is 0.0018

" " " " $> E_a = 4 \langle K_{tr} \rangle$ is 0.0076

$\frac{0.0076}{0.0018} = 4.2$ So there are 4.2 times as many molecules with the necessary E_a at 375K as there are at 300K (A)