

ENGINEERING TRIPOS PART IIB 2013
MODULE 4A9 – MOLECULAR THERMODYNAMICS

ANSWERS

1.

2. (a)
$$A = \frac{a^2 N}{D^2 V} \left(\frac{\bar{R}T}{2\pi} \right)^{1/2}$$

(b)
$$\sqrt{M_1} \ln \left(\frac{Y_1}{Y_{1,0}} \right) = \sqrt{M_2} \ln \left(\frac{Y_2}{Y_{2,0}} \right)$$

(c)
$$\lambda_i = 4\lambda \left(1 + \frac{d_i}{d} \right)^{-2}, \quad B_i = \left(1 + \frac{d_i}{d} \right)^{-2}$$

3. (c) $c_{v,vib} / R = 0.921$ 2.3% reduction due to dissociation

4. (b) (i) $1 \times \Omega_0$ (ii) $\Omega_0 \times \exp(-6.72 \times 10^{21})$ (c) $\alpha = 4.52 \times 10^{22}$

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