

1.

$$\frac{n_A n_B}{n_{AB}} \propto \frac{\phi_A \phi_B}{\phi_{AB}}$$

- understandable, population proportional to Boltzmann weighted sum over states available.

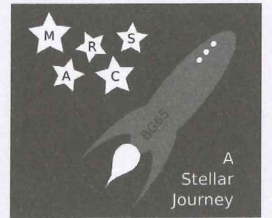
$$K_{vJ} \propto n_{AB}(v, J) f_{vJ} = n_{AB} \frac{(2J+1) e^{-\epsilon_{vJ}/kT}}{\phi_{AB}} f_{vJ}$$

relative weight of initial state to total part func.

but can write  $\frac{n_{AB}}{\phi_{AB}} \propto \frac{n_A n_B}{\phi_A \phi_B}$

ie. total occupied states relative to availability is related for molecule & atoms  
(modified by a zero point energy correction and mass correction to translational part)

so can write  $K \propto \frac{n_A n_B}{\phi_A \phi_B}$



2.

But we'll still need  $K$ , equilibrium constant  
to calculate  $n_A$  &  $n_D$  in a molecular  
equilibrium calculation.