* Continue Here $[E_A - E_B]$

$$\Rightarrow \frac{P_A}{P_B} = e^{-\frac{1}{K_B \cdot T}[E_A - E_B]}$$ [redacted]

Final Answer for ① $\frac{P_A}{P_B} = e^{-\frac{1}{K_B \cdot T}[E_A - E_B]}$ *

(1) Consider an adsorbate system that has two possible adsorption sites that are denoted by letters *A* and *B*. Furthermore, it is known that the energy of the gas molecule that is adsorbed at site *A* is E_A and it is E_B for a gas molecule that is adsorbed at site *B*. State the ratio of the probability of observing the gas molecule at site *A* to the probability of observing the gas molecule at site *B* i.e., the value of the ratio $\frac{p_A}{p_B}$.

$$w(m) = \frac{M}{m_A!\, m_B!}$$

$$P_j = \frac{e^{\frac{-E_i}{K_B \cdot T}}}{\sum e^{\frac{-E_i}{K_B T}}}$$

$\Rightarrow$ $m_A + m_B = M$ (Total absorbtion sites)

m_A : Adsorbtion site for gas A (Number of)

m_B : Adsorbtion site for gas B (Number of

$w(m)$ The number of ways we can arrange gas A & B in absorbtion sites A & B

$$\frac{P_A}{P_B} = \left[\frac{e^{\frac{-E_A}{K_B T}}}{e^{\frac{-E_A}{K_B T}} + e^{\frac{-E_B}{K_B T}}}\right] \cdot \left[\frac{e^{-\frac{E_A}{K_B T}} + e^{\frac{-E_B}{K_B T}}}{e^{\frac{-E_B}{K_B \cdot T}}}\right]$$