In the discussion of the Lindemann mechanism, it was assumed that the rate of activation by collisions with another reactant molecule, A, was the same with a non-reactant molecule, M, such as an inert gas. What if the rates of activation for these two process are different? In this case, the mechanism become

 k1

$$A +M ⇄A\* + M$$

 k-1

 k2

$$A +A ⇄A\* + A$$

 k-2

$A\* → P $

Demonstrate that the rate law expression for this mechanism is:

 $R= \frac{k3(k1\left[A\right]\left[M\right]+k2[A]\^2}{k-1\left[M\right]+k-2\left[A\right]+k-3}$