$$\text{Rate} = k[A]^x[B]^y[C]^z$$

$$\text{Rate} = k[A]^0[B]^2[C]^1$$

$$\boxed{\text{Rate} = k[B]^2[C]}$$

$$\frac{\text{rate 2}}{\text{rate 3}} = \frac{k[A]_2^x}{k[A]_3^x}$$

$$\frac{1.27\times10^{-10}}{1.27\times10^{-10}} = \frac{k[.0025]^x}{k[.0050]^x}$$

$$1 = \left(\frac{1}{2}\right)^x$$

$$x = 0$$

$$\frac{\text{Rate 1}}{\text{Rate 2}} = \frac{k[A]_1^x[B]_1^y[C]_1^z}{k[A]_2^x[B]_2^y[C]_2^z} = \frac{[B]_1^y}{[B]_2^y} = \left(\frac{[B]_1}{[B]_2}\right)^y$$

$$\frac{3.16\times10^{-11}}{1.27\times10^{-10}} = \left(\frac{.0025}{.0050}\right)^y$$

$$.2488 = \left(\frac{1}{2}\right)^y$$

$$\approx \frac{1}{4} = \left(\frac{1}{2}\right)^y$$

$$y = 2$$

$$\frac{\text{rate } 3}{\text{rate } 4} = \frac{k[A]_3^x[B]_3^y[C]_3^z}{k[A]_4^x[B]_4^y[C]_4^z}$$

$$\frac{1.27\times10^{-10}}{1.02\times10^{-9}} = \frac{(.0050)^1}{(.0100)^1} \cdot \frac{(.0050)^2}{(.0100)^2} \cdot \frac{(.0025)^z}{(.0050)^z}$$

$$.12451 = \frac{.000025}{.0001} \cdot \left(\frac{1}{2}\right)^z$$

$$\approx \frac{1}{8} = \frac{1}{4}\left(\frac{1}{2}\right)^z$$

$$z = 1$$

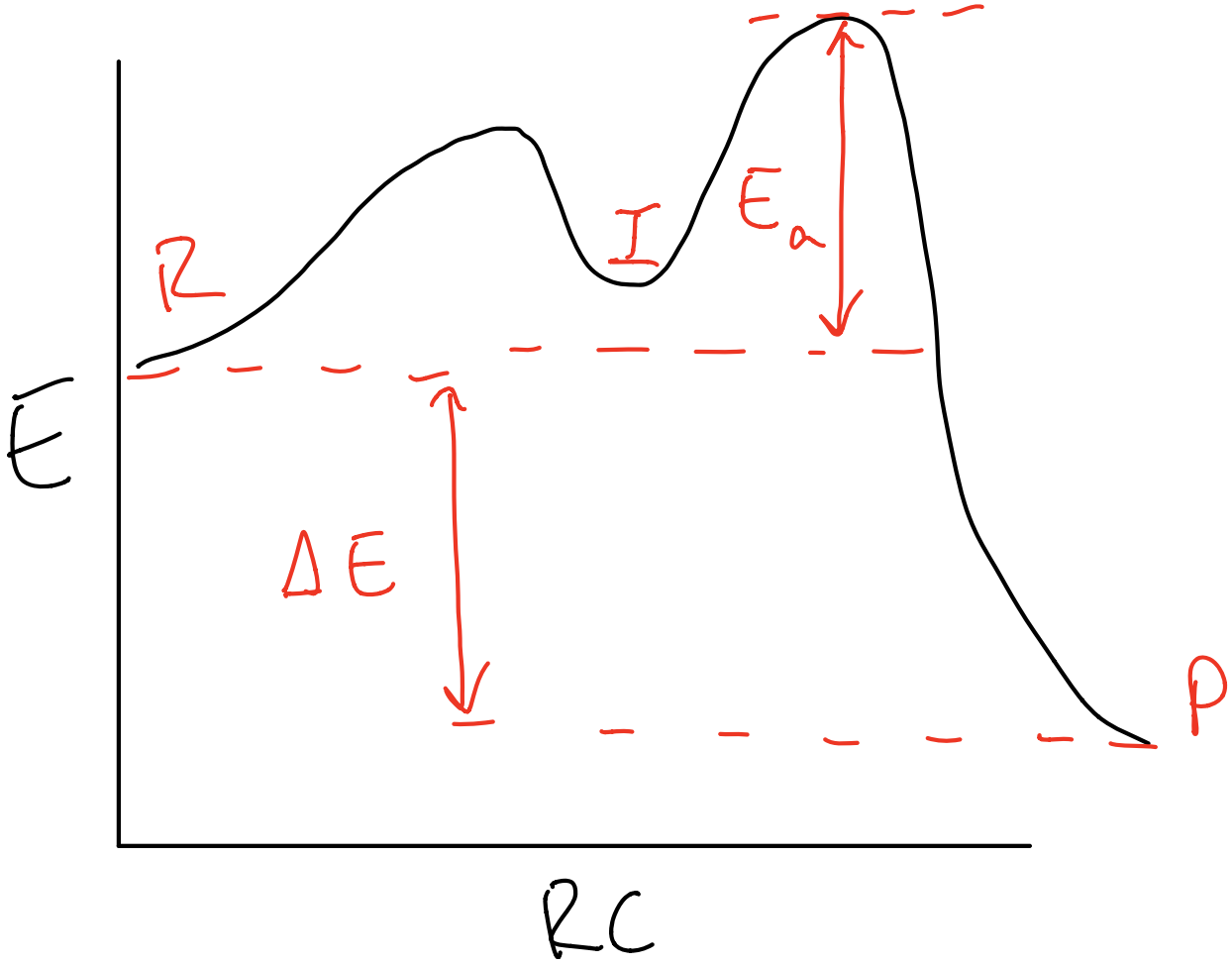
$$\text{Rate} = k \frac{[O_3]^2}{[O_2]}$$

doubling $[O_3]$ = quad. rate

doubling $[O_2]$ = halving rate

$$O_3 \rightleftharpoons O_2 + O\cdot \quad \text{fast}$$

$$O\cdot + O_3 \rightarrow 2O_2 \quad \text{slow}$$



a) positions of reactants and products

b) Activation energy

c) ΔE for rxn

d) Location of the intermediate

e) Which part of the graph represents the rate-determining step

slow $NO_2 + NO_2 \rightarrow NO_3 + NO$

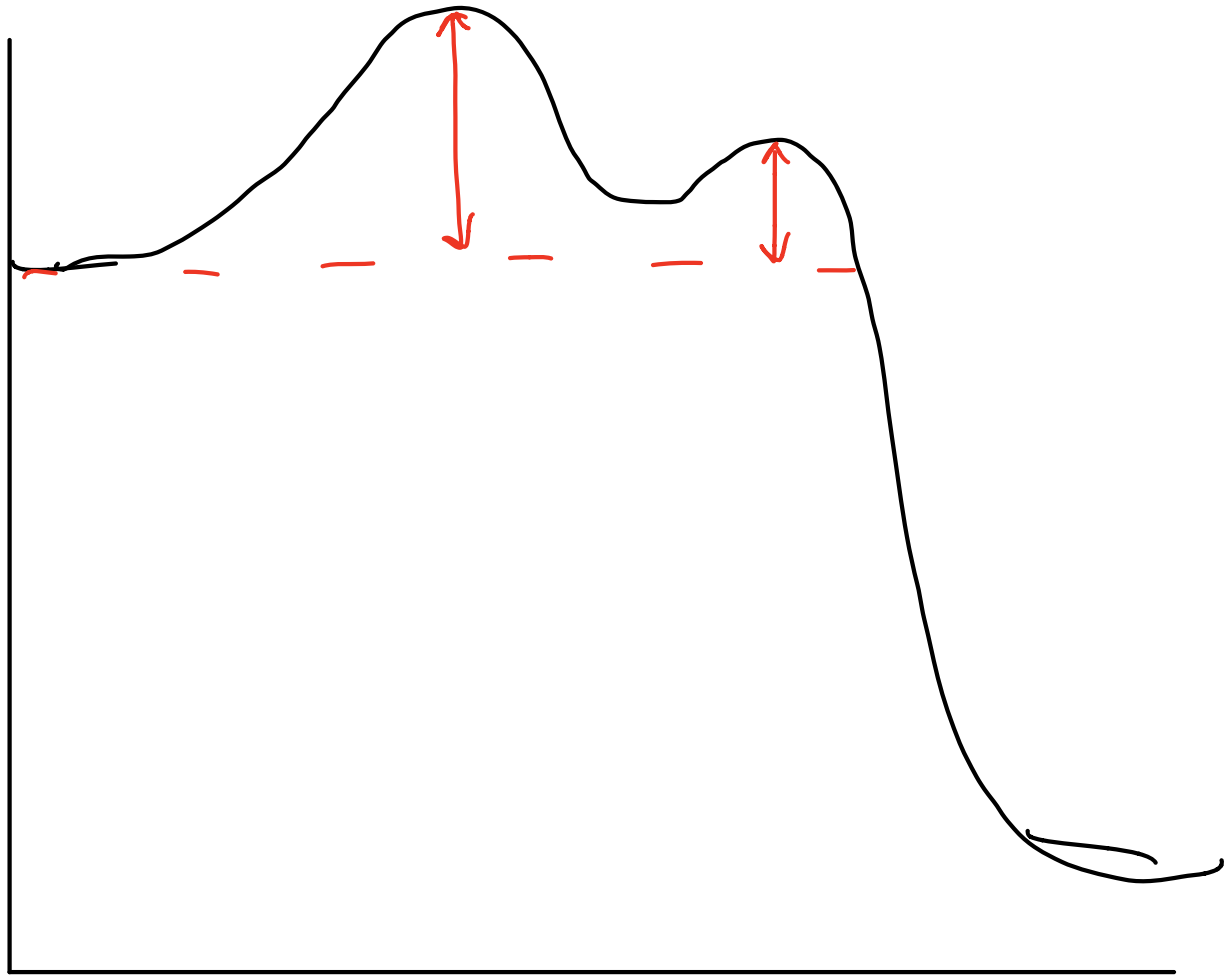
fast $NO_3 + CO \rightarrow NO_2 + CO_2$

Write the rate law for this mechanism:

$$\text{rate} = k[A]^x[B]^y$$

$$\text{rate} = k[NO_2][NO_2]$$

$$\boxed{\text{rate} = k[NO_2]^2}$$



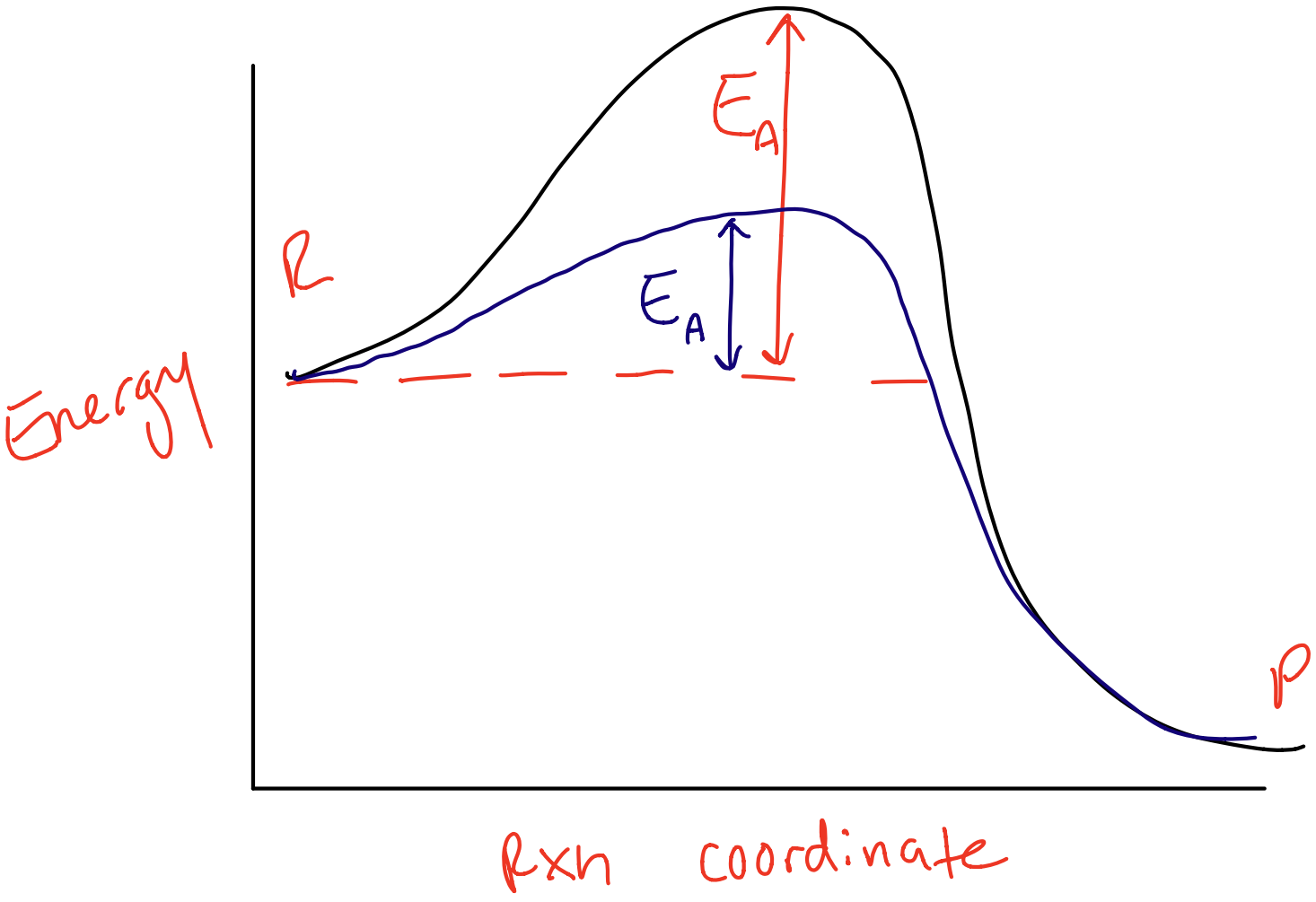
$$B + D \rightleftharpoons BD \quad \text{(fast)}$$

$$BD + B \rightarrow$$

$$\text{rate} = k[B][D][B]$$

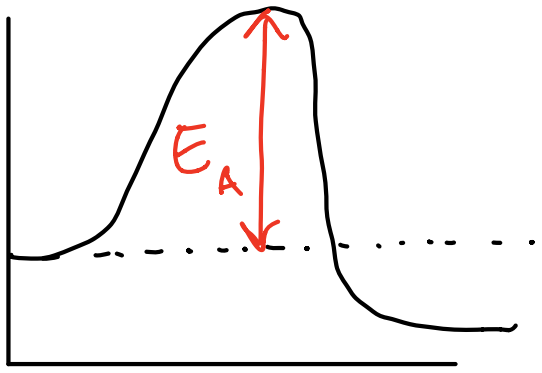
$$\text{rate} = k[B]^2[D]$$

$$A + B \rightarrow C$$



The activation energy for this rxn, $X + 2Y \rightarrow 3Z$, shown in the diagram, could be

rate = k[X][Y]



a) increased by increasing [X]

b) increased by increasing [X] and [Y]

c) increased by increasing temperature

d) increased by removing Z from the system as it forms

e) decreased by adding a suitable catalyst