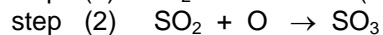
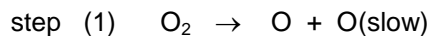


Reaction Mechanism Questions

1. The reaction $2 \text{SO}_2 + \text{O}_2 \rightarrow 2 \text{SO}_3$ has a three step reaction mechanism.

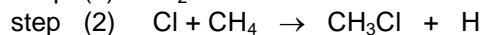
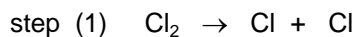


(a) What is the third step of this reaction mechanism? \rightarrow

(b) Identify the intermediate species in this reaction mechanism. _____

(c) What role does step I of the above reaction mechanism play ?

2. The reaction $\text{Cl}_2 + \text{CH}_4 \rightarrow \text{CH}_3\text{Cl} + \text{HCl}$ has a three step reaction mechanism.



(a) What is the third step of this reaction mechanism? \rightarrow

(b) Identify the intermediate species in this reaction mechanism. _____ and _____

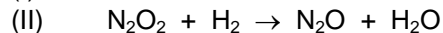
(c) How does a catalyst increase the reaction rate?

3. The decomposition of nitrogen dioxide $2 \text{NO}_2 \rightarrow 2 \text{NO} + \text{O}_2$ occurs in a two step mechanism.

The first step is $\text{NO}_2 \rightarrow \text{NO} + \text{O}$. Predict a possible second step that, when combined with the first step, gives the complete reaction.

\rightarrow

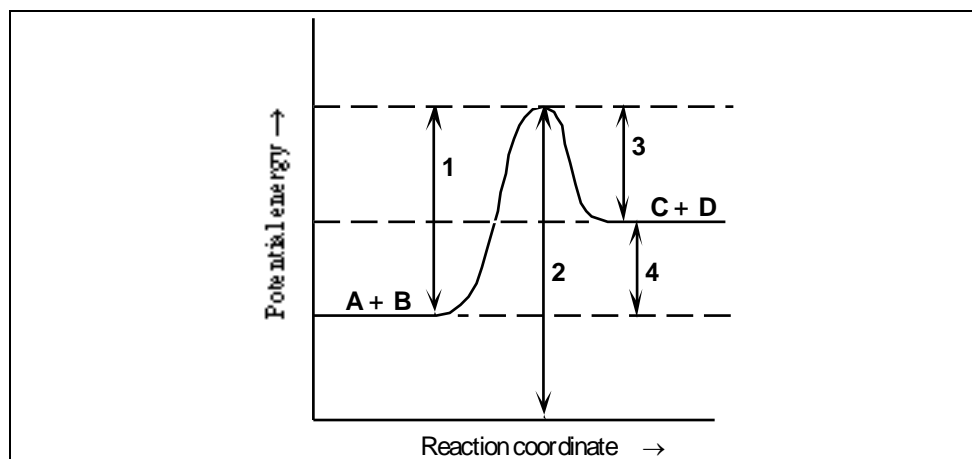
4. Consider the following reaction: $2 \text{H}_2 + 2 \text{NO} \rightarrow \text{N}_2 + 2 \text{H}_2\text{O}$. This reaction has a three step mechanism. The first two steps are given below, what is the third step? Identify the intermediate species.



\rightarrow

5. What is a rate determining step ?

The potential–energy diagram for the reaction $A + B \rightarrow C + D$ is



What interval represents the activation energy for this reaction?

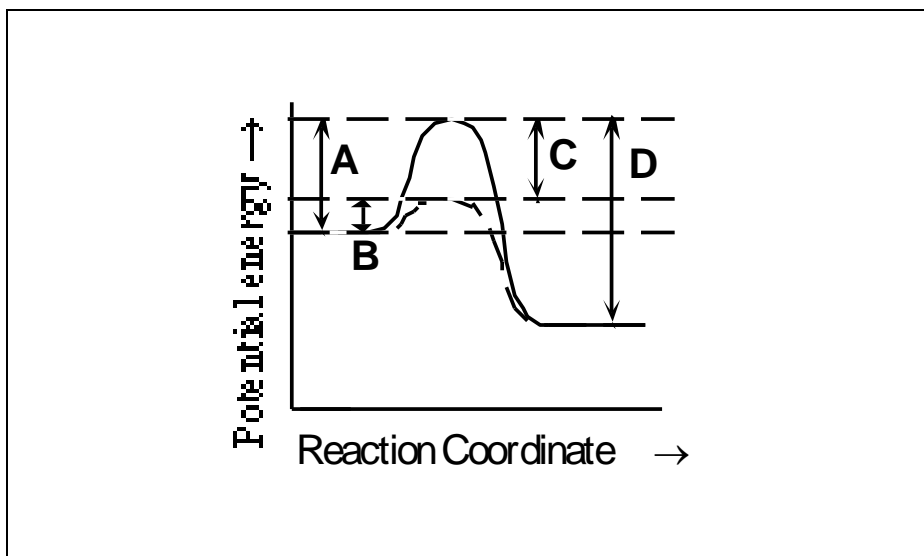
What interval represents the net energy change for this reaction?

Is this reaction, as written, endothermic or exothermic?

From the given information, would you hypothesize that this reaction is spontaneous or nonspontaneous?

What are the answers to these same questions for the reverse reaction?

This figure represents potential energy diagrams of two different mechanisms for one chemical reaction.



The activation energy for the un-catalyzed reaction is represented by:

The activation energy for the catalyzed reaction is represented by:

The decrease in activation energy when using a catalyst is represented by:

Is this reaction, as written, endothermic or exothermic?