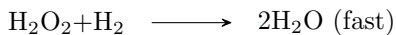
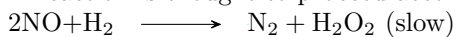


46. A reaction is thought to proceed according to the following mechanism.



(a) What is the overall reaction equation?

(b) What is true about the $[\text{H}_2\text{O}_2]$ at any time during the reaction?

(c) Which of the steps in the mechanism is the rate-determining step?

(d) What would happen to the overall rate if some extra NO was injected into reaction mixture?

(e) If it were somehow possible to speed up the second step in the mechanism, what effect would this have on the overall rate of the reaction?

(f) What is the formula of the activated complex in the 1st step of the reaction? In the second step?

(g) How many elementary processes are involved in the reaction?

47. What is the difference between an activated complex and a reaction intermediate?

48. The reaction $\text{A} \rightarrow \text{C}$ is known to have the mechanism:



What would you expect to be true about the concentration of B as the reaction proceeds?

49. You have been told that phosphorous can be prepared by means of the reaction

$$2\text{Ca}_3(\text{PO}_4)_2 + 6\text{SiO}_2 + 10\text{C} \longrightarrow \text{P}_4 + 6\text{CaSiO}_3 + 10\text{CO}.$$
 Why can you be certain that the reaction equation shown does not represent a reaction mechanism?
50. A two step mechanism IS proposed for a reaction: $\text{ClO}^- + \text{ClO}^- \longrightarrow \text{ClO}_2^- + \text{Cl}^-$
 $2\text{ClO}_2^-, + \text{ClO}^- \longrightarrow \text{ClO}_3^-, + \text{Cl}^-$
 (a) What is the overall reaction which occurs?
- (b) Is ClO , a reaction intermediate or an activated complex?
- (c) What is the chemical formula for the activated complex in the second step?
51. The decomposition of acetone, $(\text{CH}_3)_2\text{CO}$, proceeds according to

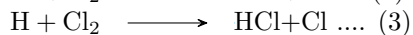
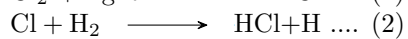
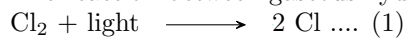
$$2(\text{CH}_3)_2\text{CO} \longrightarrow \text{C}_2\text{H}_4 + 2\text{CO} + 2\text{CH}_4.$$
 If the decomposition is a two-step reaction, and the second step is

$$2\text{CH}_2\text{CO} \longrightarrow \text{C}_2\text{H}_4 + 2\text{CO},$$
 (a) what is the first step?
- (b) what is the formula for the activated complex in the first step? The second step?
52. A chemist suggested that the reaction: $2\text{NO} + \text{O}_2 \longrightarrow \text{NO}_2$ has a three-step mechanism.
 If the proposed first and third steps are:

$$2\text{NO} \longrightarrow \text{N}_2\text{O}_2 \text{ (first)}$$

$$\text{N}_2\text{O}_4 \longrightarrow 2\text{NO}_2 \text{ (third),}$$
 (a) what is the second step in the proposed reaction?
- (b) what is the formula of the activated complex in the second step?

53. The reaction between gaseous hydrogen and chlorine proceeds as follows.



(a) Suggest what step might occur after step 3? [Hint: Steps 2 and 3 show what happens when an individual pair of Cl and H₂ react; not all the Cl's and H₂'s react at once.]

(b) What function is served by the light?

(c) Suggest why this reaction is called a "chain reaction".

54. 54. Which of the steps in the reaction $4\text{HBr} + \text{O}_2 \longrightarrow 2\text{H}_2\text{O} + 2\text{Br}_2$ has the greatest activation energy? Which has the least?

55. In the following PE diagram :

(a) How many steps does this reaction have?

(b) Is the second step (B → C) exothermic or endothermic?

(c) Is the overall reaction exothermic or endothermic?