

Kinetics: The Arrhenius Equation

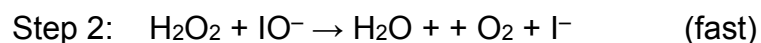
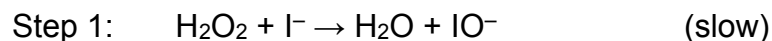
1. The rate constants for the decomposition of a certain substance were measured at five different temperatures. The data is given in the table below. Graphically determine the activation energy of the reaction in kJ/mol.

k ($\text{M}^{-1}\text{s}^{-1}$)	T (K)
3.81×10^{-10}	500
5.90×10^{-4}	950
3.90×10^{-3}	1100
0.221	1500
2.05	2000

2. A reaction has an activation energy of 205 kJ/mol. At 250.°C, the rate constant is $4.45 \times 10^{-3} \text{ s}^{-1}$. Calculate the rate constant at 350.°C.

Kinetics: Reaction Mechanisms

1. Consider the following two step mechanism for decomposition of hydrogen peroxide.

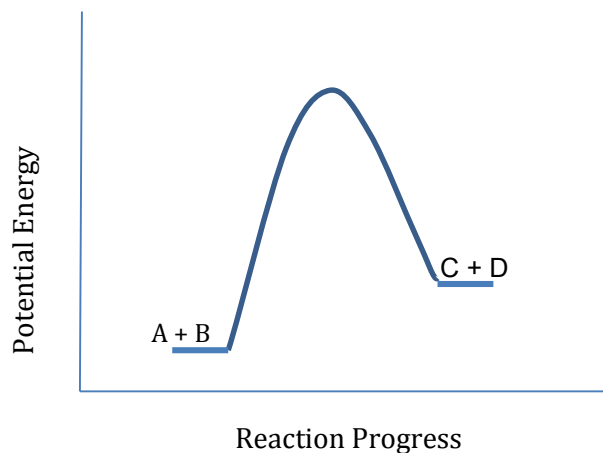


Answer each of the following questions.

- Which substance or substances are intermediates?
- Which substance (if any) is a catalyst?
- What is the overall reaction?
- What is the rate law?

Kinetics: Catalysts

1. Examine the following diagram depicting the potential energy diagram for the reaction: $A + B \rightarrow C + D$.



Draw (within the same diagram above) the potential energy curve if an effective catalyst is used in the reaction.

2. Describe the similarities and differences between the following.
- A homogeneous catalyst.
 - A heterogeneous catalyst.
 - An enzyme.