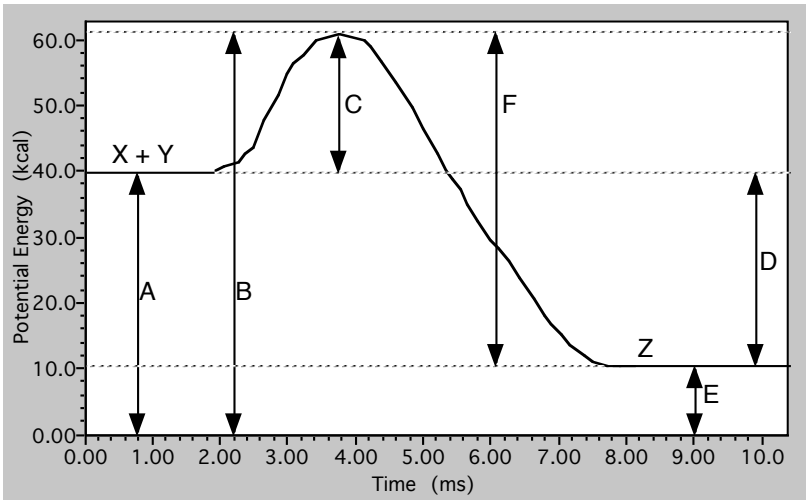
Potential Energy Diagrams

Graph 1: Use the potential energy diagram for the reaction X + Y -> Z to complete the chart below.



Letter	Term	Description
A		
B		
C		
D		
E		

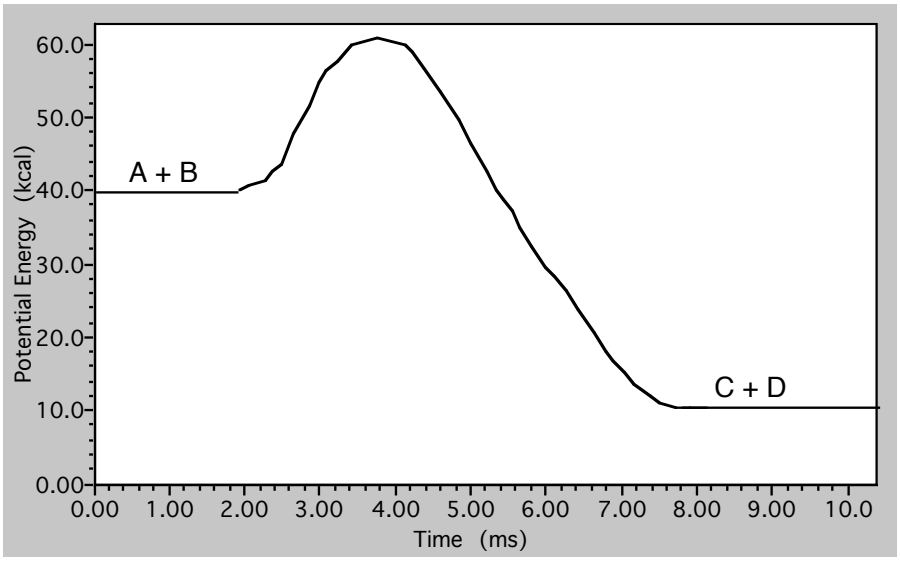
Graph 2

1. Draw a potential energy diagram for an endothermic reaction.
2. Label your drawing with the following letters:

A=PE of products
B=PE of reactants
C=PE of the activated complex
D=Energy of activation
E=Heat of reaction

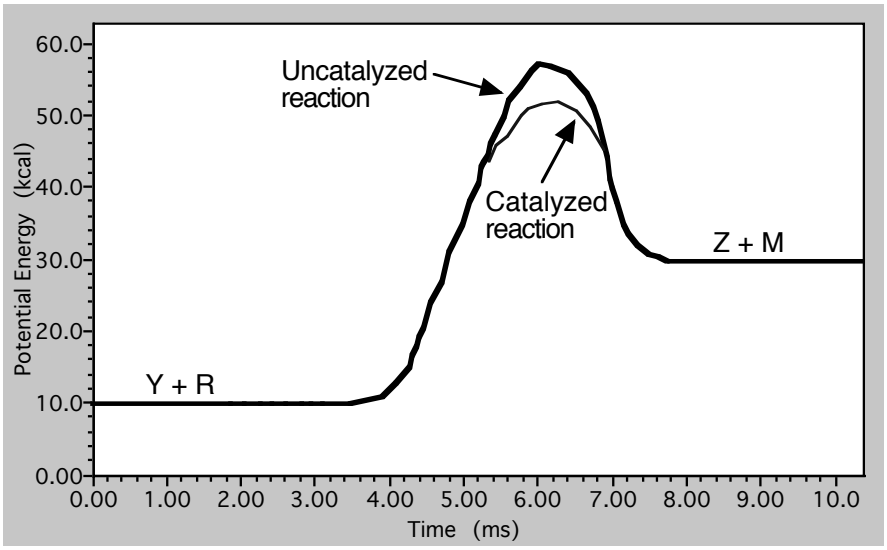
Potential Energy Diagrams

Graph 3: Use the potential energy diagram for the reaction A + B -> C + D to answer the following questions.



1. Is the reaction exothermic or endothermic?
2. What is the value of ΔH?
3. What is the value of the activation energy of the reaction?
4. What is the potential energy of the products?
5. What is the potential energy of the activated complex?

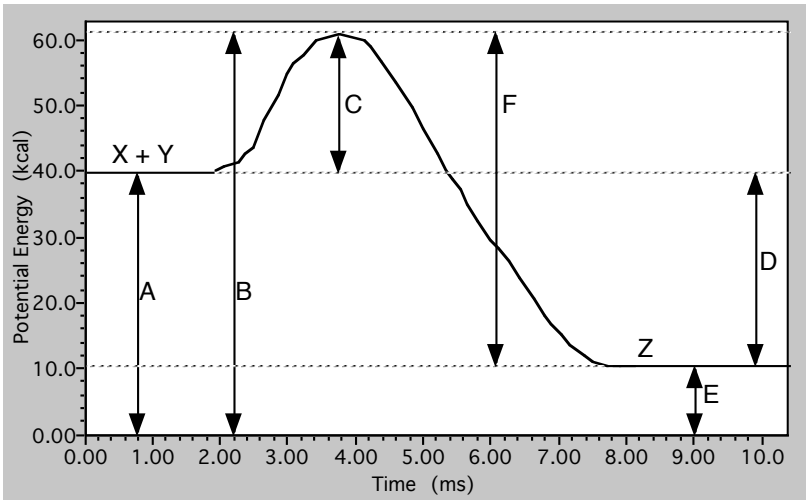
Graph 4: Use the potential energy diagram for the reaction Y + R -> Z + M to answer the following questions.



1. Is the reaction exothermic or endothermic?
2. What is the value of the activation energy of the uncatalyzed reaction?
3. What is the value of the activation energy of the catalyzed reaction?
4. What is the potential energy of the activated complex of the catalyzed reaction?
5. How does the ΔH for the catalyzed reaction compare to ΔH for the uncatalyzed reaction?

Potential Energy Diagrams

Graph 1: Use the potential energy diagram for the reaction X + Y -> Z to complete the chart below.

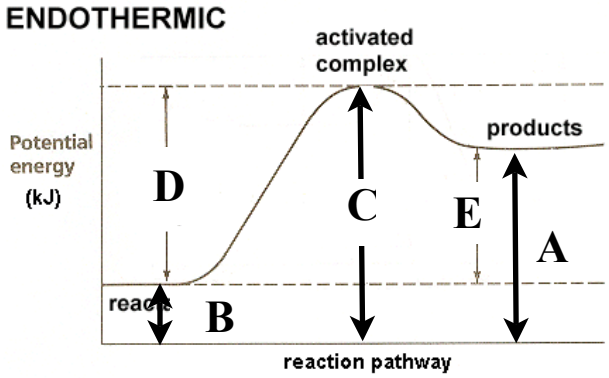


Letter	Term	Description
A	PE of Reactants	The combined amounts of the potential energy of the reactants.
B	PE of the Activated Complex	The potential energy of the activated complex.
C	Activation Energy	The amount of energy required to form the activated complex.
D	Heat of the Reaction	The amount of energy given off (or absorbed if it was endothermic) in the reaction.
E	PE of the Products	The potential energy of the product.

Graph 2

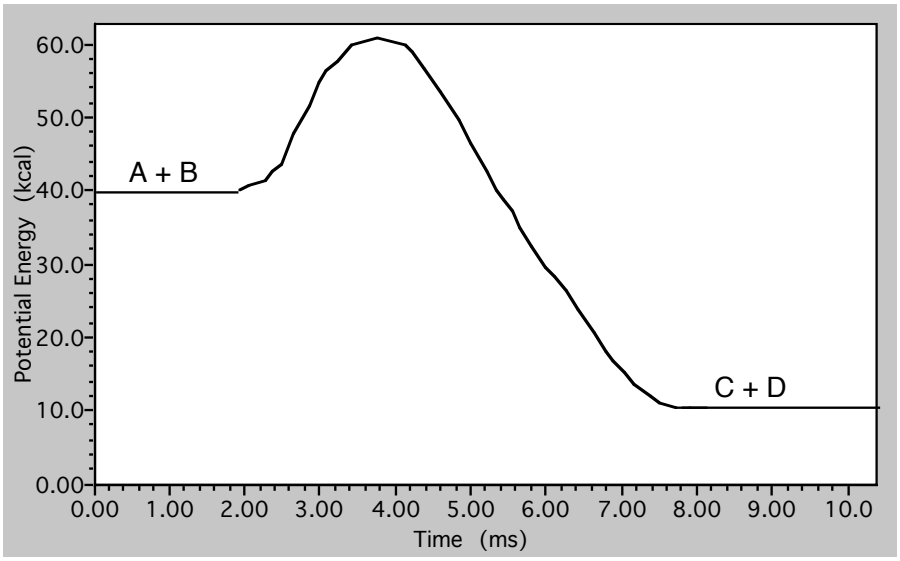
1. Draw a potential energy diagram for an endothermic reaction.
2. Label your drawing with the following letters:

A=PE of products
B=PE of reactants
C=PE of the activated complex
D=Energy of activation
E=Heat of reaction



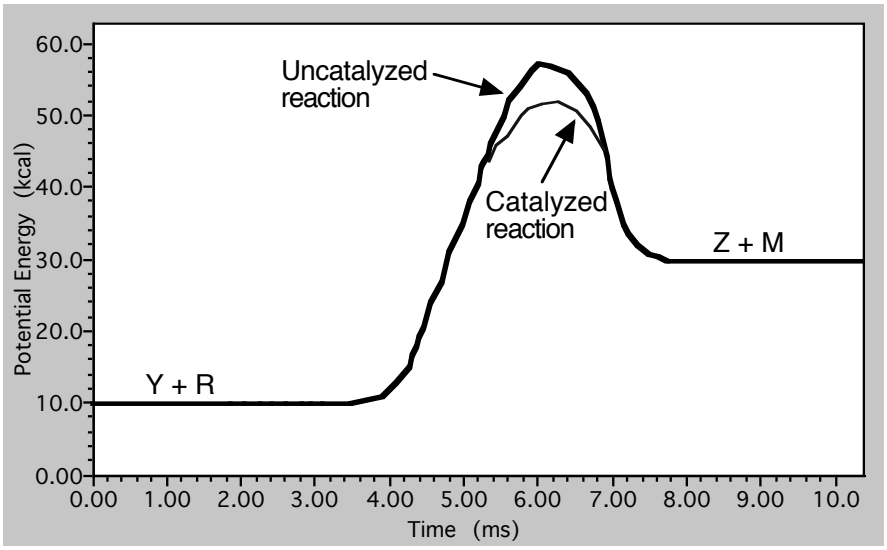
Potential Energy Diagrams

Graph 3: Use the potential energy diagram for the reaction A + B -> C + D to answer the following questions.



1. Is the reaction exothermic or endothermic?
   exothermic
2. What is the value of ΔH?
   10 - 40 = -30 kcal
3. What is the value of the activation energy of the reaction?
   60 - 40 = 20 kcal
4. What is the potential energy of the products?
   10 kcal
5. What is the potential energy of the activated complex?
   60 kcal

Graph 4: Use the potential energy diagram for the reaction Y + R -> Z + M to answer the following questions.



1. Is the reaction exothermic or endothermic?
   endothermic
2. What is the value of the activation energy of the uncatalyzed reaction?
   58 - 10 = 48 kcal
3. What is the value of the activation energy of the catalyzed reaction?
   52 - 10 = 42 kcal
4. What is the potential energy of the activated complex of the catalyzed reaction?
   52 kcal
5. How does the ΔH for the catalyzed reaction compare to ΔH for the uncatalyzed reaction?
   They are exactly the same (20 kcal). The addition of the catalyst does not change the heat of the reaction (ΔH) it only changes the activation energy.