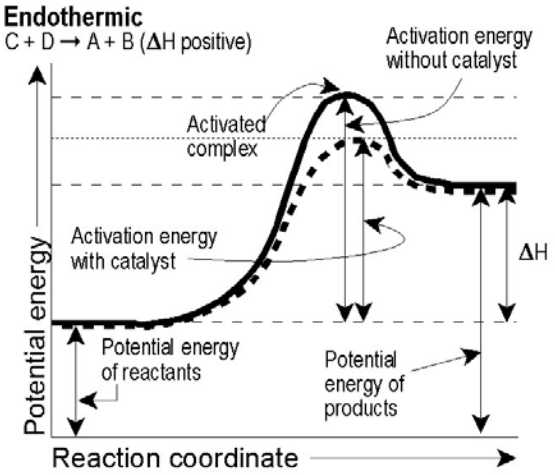
Role of Energy in Reactions

In order for a reaction to begin, energy is needed to form an activated complex. The energy needed to form an activated complex is called activation energy. It comes from effective collisions. Activation energy is needed whether heat is absorbed or released during a chemical reaction. Heat absorbed or released during a chemical reaction is called **heat of reaction** or **enthalpy** (ΔH). Enthalpy is the difference between the potential energy of the products and the reactants ($\Delta H = H_{products} - H_{reactants}$). In exothermic reactions, ones in which energy is released, the potential energy of the products is lower than the potential energy of the reactants and ΔH is negative. For endothermic reactions, ones in which energy is absorbed, the potential energy of the products is higher than the potential energy of the reactants and ΔH is positive. Catalysts reduce the activation energy for both exothermic and endothermic reactions but have no effect on the change in enthalpy.



Answer the questions below based on the reading and the graph above, and based on your knowledge of chemistry.

1. Based on the graph above:
   a. Which has the highest energy–the reactants, the products, or the activated complex? _____
   b. Which has the lowest energy–the reactants, the products, or the activated complex? _____
2. If the reactants have a potential energy of 10.2 kJ/mol and the products have a potential energy of 15.7 kJ/mol, what is ΔH? _____
3. What effect do catalysts have on ΔH? _____
4. Catalysts are used to speed up chemical reactions. Based on the graph above, how do they do this? _____

   _____

   _____
5. What is an endothermic reaction? What information on the graph above shows that the reaction pictured is endothermic? _____

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