Activation Energy Encyclopedia Article

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BOOKRAGS

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The term activation energy refers to the minimum amount of **energy** required for a chemical reaction to occur. Most reactions require that **atoms** and **molecules** crash into each other with a great deal of force. These violent collisions must occur with enough energy to cause the chemical bonds within the molecules to be weakened or broken. When this occurs, the reactant molecules form an **activated complex** from which the product molecules are formed. Depending on the strength of the bonds within the reactant molecules the activation energy can be quite large, making the activated complex difficult to form.

Fortunately most activation energies are large enough so that many combinations of substances can coexist at room temperature without reacting to a great extent, even if they are favored by **thermodynamics**. For example, it is thermodynamically favorable for organic materials and fuels such as **wood**, **coal**, oil, and gas to react with **oxygen** to form **carbon dioxide** and **water**. Yet fuels and other organic compounds, including living organic tissue, come into contact with oxygen all the time under normal conditions and are very stable. We know from experience that these reactions don't occur unless we provide a spark that supplies the needed activation energy. Only then do these reactions occur readily.

Thanks to activation energies many combinations of substances remain stable and non-reactive under normal conditions for a very long time. If this were not the case, many of the materials and fuels that we now take for granted would long ago have literally "go up in smoke."