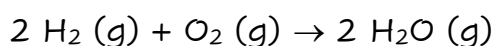


## Catalysts

1. Name five factors that will affect the rate of reaction. Provide an example of each. *Nature of reactants, temperature, surface area, concentration, catalyst.*
2. Explain why if a lit match is applied to a lump of coal there is little effect, but if a lit match is applied to coal dust the result is an explosive reaction. *There is more surface area in the coal dust for the oxygen to react.*
3. The following reaction has a high activation energy, is exothermic, and self-sustaining.



Why is it unlikely the reaction occurs as a single step, and how can the reaction rate be increased?

*Due to the high activation energy. A catalyst can be added to lower the activation energy therefore, a new mechanism will be the result.*

4. How does a catalyst increase the rate of a reaction?  
*It lowers the activation energy of the reaction by providing an alternate mechanism.*
5. Indicate which of the following are heterogeneous or homogeneous catalysts.
  - a) Rhodium and platinum metals are used in a car's catalytic converter to convert exhaust gases into safer gases.  
*Heterogeneous*
  - b) Gaseous chlorofluorocarbons (CFCs) have been shown to catalyze the breakdown of ozone in the upper atmosphere.  
*Homogeneous*
  - c) Aqueous sulfuric acid will catalyze the decomposition of aqueous formic acid into carbon monoxide and water.  
*Homogeneous*
  - d) Powdered  $\text{TiCl}_4$  is used in the production of polyethylene polymer from gaseous ethylene. *Heterogeneous*