Name: _____ Block: _____ Date: _____

The Great Apple Bob

A Scientific Investigation into the Rates of Reactions

According to what is called "The Collision Theory", there are four things that can affect the rate of a chemical reaction:

1. Concentration
2. Surface Area
3. Catalysts
4. Temperature

In the following scientific investigation we will be studying the following reaction:

HAb + WA → A + W(HAb)

Where Hab = Human Apple-bobber; W = wet; and A = Apple. In other words, "one human apple-bobber combines with one wet apple to produce one apple and a wet human apple-bobber". (*This is a single-replacement reaction.*)

Raw Apple Data:

Rate Change Factor	Description of Event	Time Trials 1	2	Average Time
Concentration	*1. Bind-folded, one apple in tank*			
	2. Blind-folded, 4 apples in tank			
Surface Area	*1. Blind-folded, one whole apple*			
	2. Blind-folded, one apple cut into 8 pieces			
Catalyst	*1. One apple stuck with 12 wooden skewers (pick-up with skewers allowed)*			
	2. One apple without skewers			
Temperature	*1. One apple in cold, ice water*			
	2. One apple in warm, bath-like water			

Questions:

1. According to the above data, what factors cause the fastest retrieval of the apples from the water? What factors cause the slowest retrieval?
2. What other factors (other than the above four) affected the reaction rates in our investigation?
3. Compare the results from this investigation to the comments made in your textbook about affect of these four factors on reaction rates. Does your data agree with the text's descriptions?
4. Use collision theory to explain the following statements:
   a) Most reactions proceed at a faster rate if the concentration of the reactants is increased.
   b) Reactants with small surface areas react slower than reactants with large surface areas.
   c) An increase in temperature increases the rate of a reaction.
   d) The presence of a catalyst often increases the rate of a chemical reaction.
5. How does a catalyst affect the activation energy of a reaction?