Name _____ Date _____ Period _____

Collision Theory Worksheet

1) Explain collision theory.

2) What are the two things that must take place in order for a reaction to take place between molecules or atom?

3) What are 4 things that will alter the rate of a chemical reaction?

4) What is a catalyst? Explain how a catalyst will speed up a chemical reaction.

5) Use collision theory to explain why reactions should occur more slowly at lower temperatures.

6) Explain how grinding up a solid into smaller pieces can speed up the reaction. Use collision theory in your answer.

7) Explain why all reactions have an activation energy, using your knowledge of collision theory.

8) Why does increasing temperature speed up a chemical reaction? Use collision theory to explain your answer.

9) Describe the effect of increasing the concentration of the reactants on the rate of a reaction.

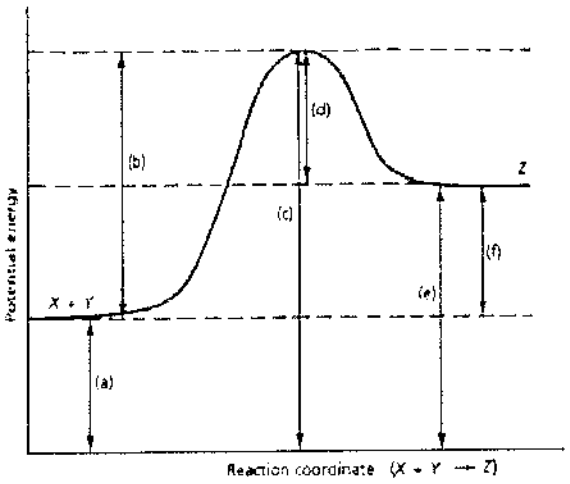
10) Draw the energy diagram for the reaction $H_2 + I_2 <--> 2HI$ where the activation energy for the forward reaction is 38.9 KJ and the enthalpy change is +3.6 KJ.

11) Show how the curve in #10 would be affected by the addition of a catalyst.

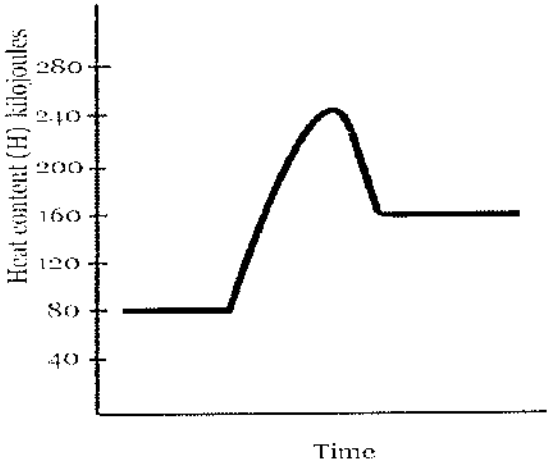
12) Read each description and indicate which factor is affecting the rate of the reaction (ie. Temperature, concentration, surface area, or catalyst)

Description	Factor influencing rate
A piece of steel wool heated in air (20% oxygen by volume) burns slowly, but when heated in pure oxygen it undergoes rapid combustion, as evidenced by a dazzling shower of sparks!	
Storing foods and milk in the refrigerator helps slow down reactions that result in spoilage and souring.	
Powdered iron mixed with melted sulfur reacts more rapidly than a lump of iron in melted sulfur.	
Manufacturing of NH_3 from the reaction of N_2 and H_2 is sped up by the addition of iron to the reaction vessel.	

Potential Energy Diagram Worksheet



1. Which of the letters a–f in the diagram represents the potential energy of the products? _____
2. Which letter indicates the potential energy of the activated complex? _____
3. Which letter indicates the potential energy of the reactants? _____
4. Which letter indicates the activation energy? _____
5. Which letter indicates the heat of reaction? _____
6. Is the reaction exothermic or endothermic? _____
7. Which letter indicates the activation energy of the reverse reaction? _____
8. Which letter indicates the heat of reaction of the reverse reaction? _____
9. Is the reverse reaction exothermic or endothermic? ____



1. The heat content of the reactants of the forward reaction is about _____ kilojoules.
2. The heat content of the products of the forward reaction is about _____kilojoules.
3. The heat content of the activated complex of the forward reaction is about _____ kilojoules.
4. The activation energy of the forward reaction is about _____ kilojoules.
5. The heat of reaction (ΔH) of the forward reaction is about _____ kilojoules.
6. The forward reaction is _____ (endothermic or exothermic).
7. The heat content of the reactants of the reverse reaction is about _____ kilojoules.
8. The heat content of the products of the reverse reaction is about _____ kilojoules.
9. The heat content of the activated complex of the reverse reaction is about _____kilojoules.
10. The activation energy of the reverse reaction is about _____ kilojoules.
11. The heat of reaction (ΔH) of the reverse reaction is about _____ kilojoules.
12. The reverse reaction is _____ (endothermic or exothermic).

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Energy Ws #1: Reaction Rates

1. Chemical reactions occur when reactants collide. For what reasons may a collision fail to produce a chemical reaction?

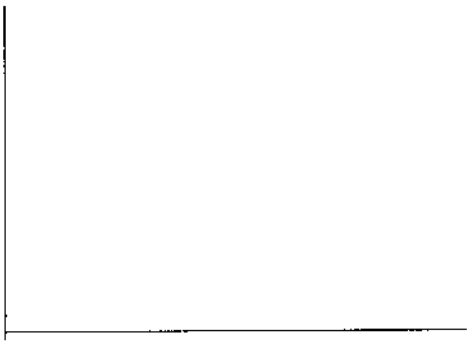
2. If every collision between reactants lead to a reaction, what determines the rate at which the reaction occurs?

3. What is the activation energy of a reaction, and how is this energy related to the activated complex of the reaction?

4. What happens when a catalyst is used in a reaction?

5. Name 4 things that will speed up or slow down a chemical reaction.

6. Draw an energy diagram for a reaction. (label the axis)
   Potential energy of reactants = 350 KJ/mole
   Activation energy = 100 KJ/mole
   Potential energy of products = 250 KJ/mole



7. Is the reaction in # 6 exothermic or endothermic? Explain.

8. How could you lower the activation energy for the reaction in #6?