Factors affecting Rate

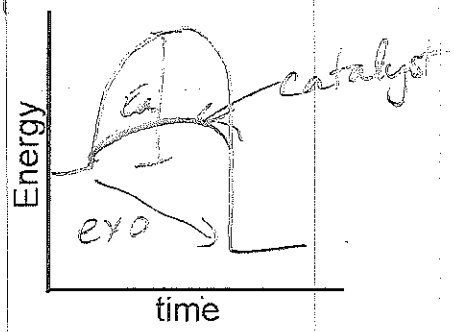
1. What are the two factors needed for a chemical reaction to occur?

energy + orientation

2. Student hypothesis: Every time two particles collide a reaction will occur. Justify or nullify.

need enough energy, must be particles (their nature) that will react + correct collision orientation

3. Draw an energy diagram to the right for the following situations.
   a. Exothermic/high activation energy
   b. Exothermic/low activation energy
   c. Endothermic/high activation energy
   d. Endothermic/low activation energy

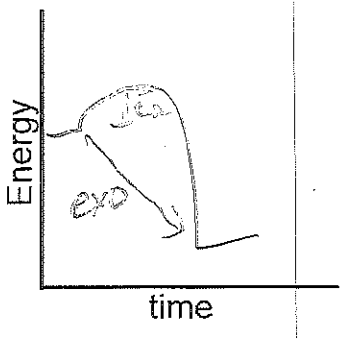


4. A pocket warming pack can be used to keep your hands warm during a cold day of ice fishing. The reaction is the oxidation of elemental iron.
   a. Write the reaction. $4Fe + 3O_2 \rightarrow 2Fe_2O_3$
   b. The current packs are powdered iron, why would solid piece of iron not be as effective?

Solid piece has less surface area

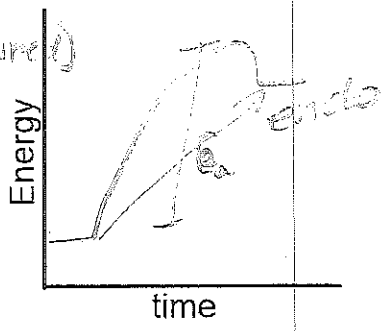
   c. How might a catalyst added to the warming pack help or hurt the products use.

(less activation energy required) Reaction would occur at a faster rate



5. On one of the energy diagrams add the energy pathway if a catalyst were added.

see top diagram

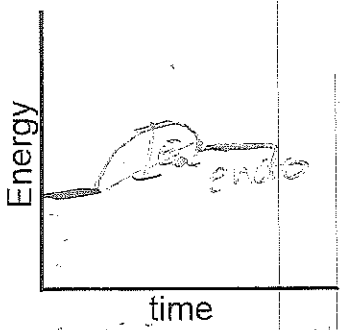


6. Catalyst analogy: A student walks to school, a catalyst added, causing the student to run to school much faster. Justify/nullify

A catalyst lower the energy needed... student is using same amount of energy

7. Relative to collision theory, how does an increase in temperature increase the rate. Explain.

More energy is available to increase the activation energy in order for reaction to occur. More reaction can occur



8. Relative to collision theory, why do most reaction slow down over time? Explain.

As the reactant amounts decrease there is less chance for a collision to occur in the correct orientation