

Factors Affecting the Rate of Chemical Reactions

1. Describe what effect cooling has on the frequency at which particles of reactants can collide. Provide a real life example as to how we use temperature to alter reactions for our benefit.
2. Describe why an increase in concentration can result in a change in the rate of a reaction. Provide a real life example as to how we adjust concentration to adjust a reaction for our benefit.
3. Complete the following table by indicating whether each of the following scenarios would either increase or decrease the rate of reaction.

Scenario	Increase or Decrease
Adding heat.	<i>Increase</i>
Removing heat	
Adding a catalyst	
Diluting a solution	
Removing an enzyme	
Lowering the temperature	
Decreasing the surface area	
Increasing the concentration of a solution	
Breaking a reactant down into smaller pieces	

4. Complete the following table by indicating which factor would have the greatest impact on the rate of reaction. Choose from concentration, temperature, surface area or catalyst.

Scenario	Factor that has the greatest impact on the rate of reaction.
Blowing air on a campfire to help get it going.	<i>concentration</i>
Raw carrots are cut into thin slices for cooking.	
Protein is broken down in the stomach by the enzyme pepsin.	
A Woolly Mammoth is found, perfectly preserved, near the Arctic circle.	
More bubbles appear when a concentrated solution of hydrochloric acid is added to a magnesium strip than when a dilute solution of the acid is added.	
Exhaust from a car engine passes through a catalytic converter changing most of the poisonous nitrogen oxides into nitrogen gas and oxygen gas.	
A dust explosion occurs in a saw mill.	

5. Use the following vocabulary terms to correctly fill in the blanks.

Vocabulary	
catalyst	energy
catalytic converter	heat
collisions	rate of reaction
concentration	surface area
dilute	temperature

- a) A freshly exposed surface of metallic sodium tarnishes almost instantly if exposed to air and moisture, while iron will slowly turn to rust under the same conditions. In these two situations, the _____ refers to how quickly or slowly reactants turn into products.
- b) Adding _____ will increase the rate of reaction because this causes the particles of the reactants to move more quickly, resulting in more collisions and more _____.
- c) Removing heat will lower the _____, causing the particles of the reactants to slow down, resulting in less frequent collisions.
- d) _____ refers to how much solute is dissolved in a solution. If there is a greater concentration of reactant particles present, there is a greater chance that _____ among them will occur. More collisions mean a higher rate of reaction.
- e) A concentrated acid solution will react more quickly than a _____ acid solution because there are more molecules present, increasing the chance of collisions.
- f) Grains of sugar have a greater _____ than a solid cube of sugar of the same mass, and therefore will dissolve quicker in water.
- g) A _____, for example an enzyme, is used to speed up a chemical reaction but is not used up in the reaction itself.
- h) A _____ in car has metallic catalysts where several reactions occur. Carbon monoxide, which was produced in the combustion of gasoline, is changed into carbon dioxide and water in the presence of these metallic catalysts.