

### 3. FACTORS AFFECTING REACTION RATES

CH40S

UNIT 2 KINETICS

WIEBE

1

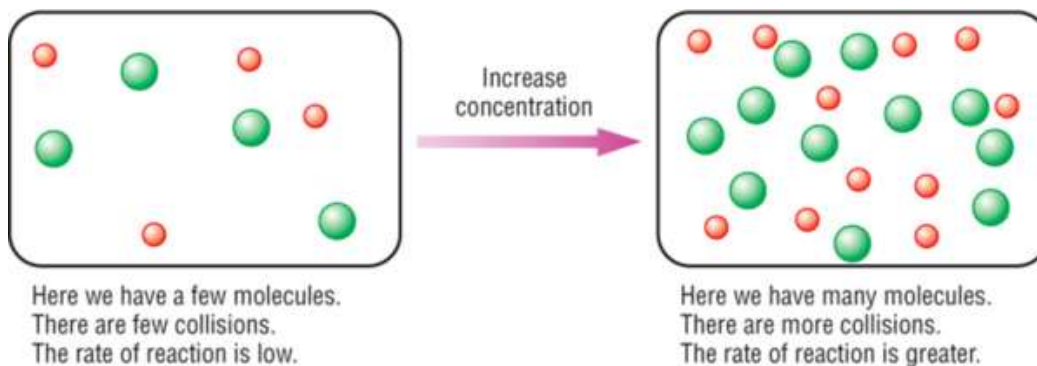
### FACTORS THAT INCREASE RATE

- An increase in reactant concentration increases the rate of a reaction.
- When reactants are in different states of matter, an increase in reactant surface area increases the rate of a reaction.
- An increase in temperature increases the rate of a reaction.
- A catalyst increases reaction rate without being consumed in the reaction.

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## INCREASING CONCENTRATION

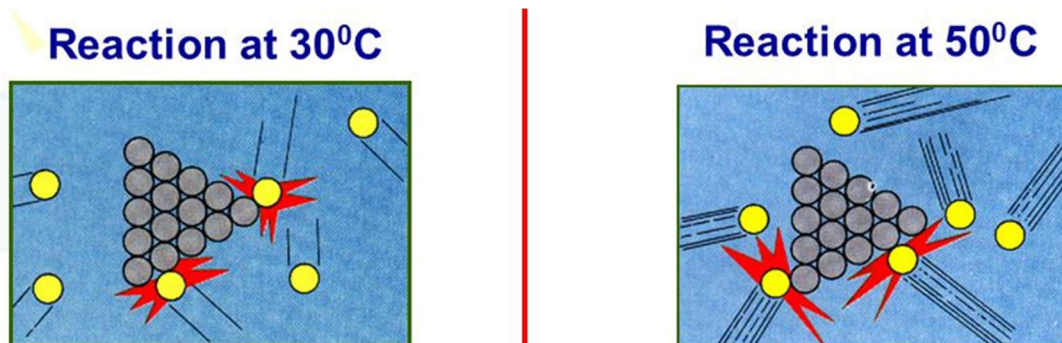
Increasing the surface area and the concentration of a reactant(s) increases the total number of collisions and so the number of effective collisions.



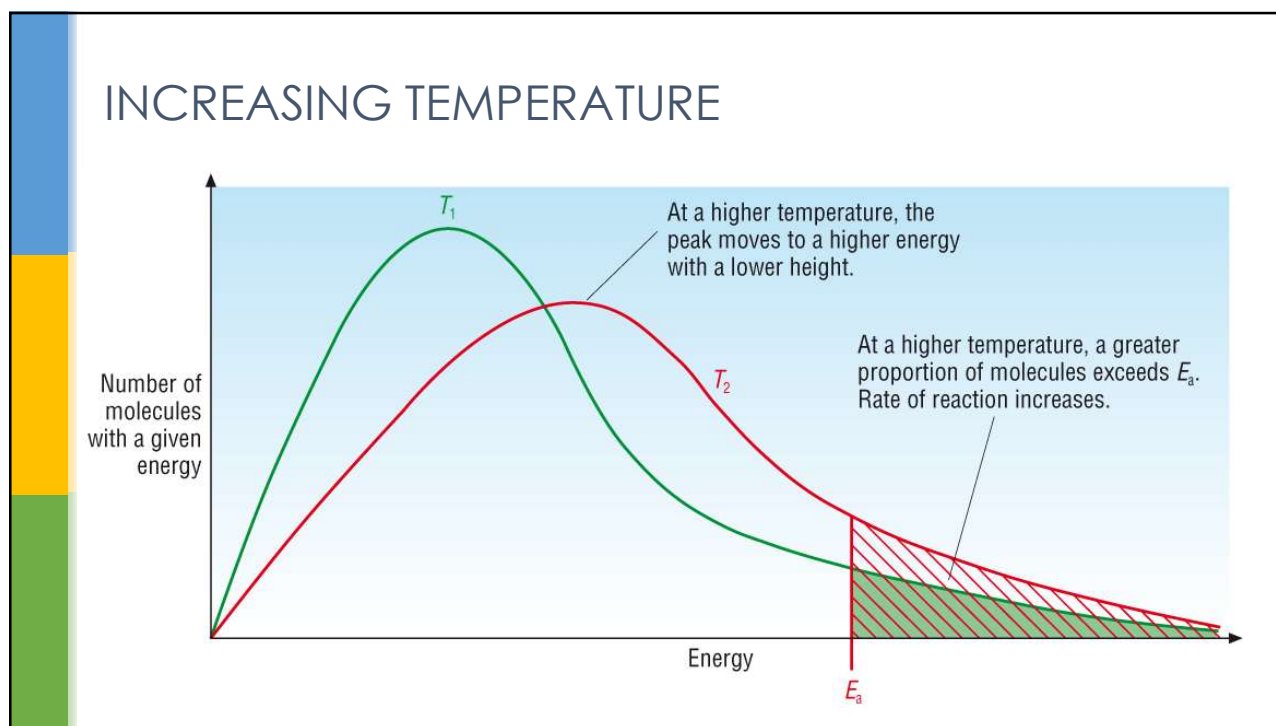
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## INCREASING TEMPERATURE

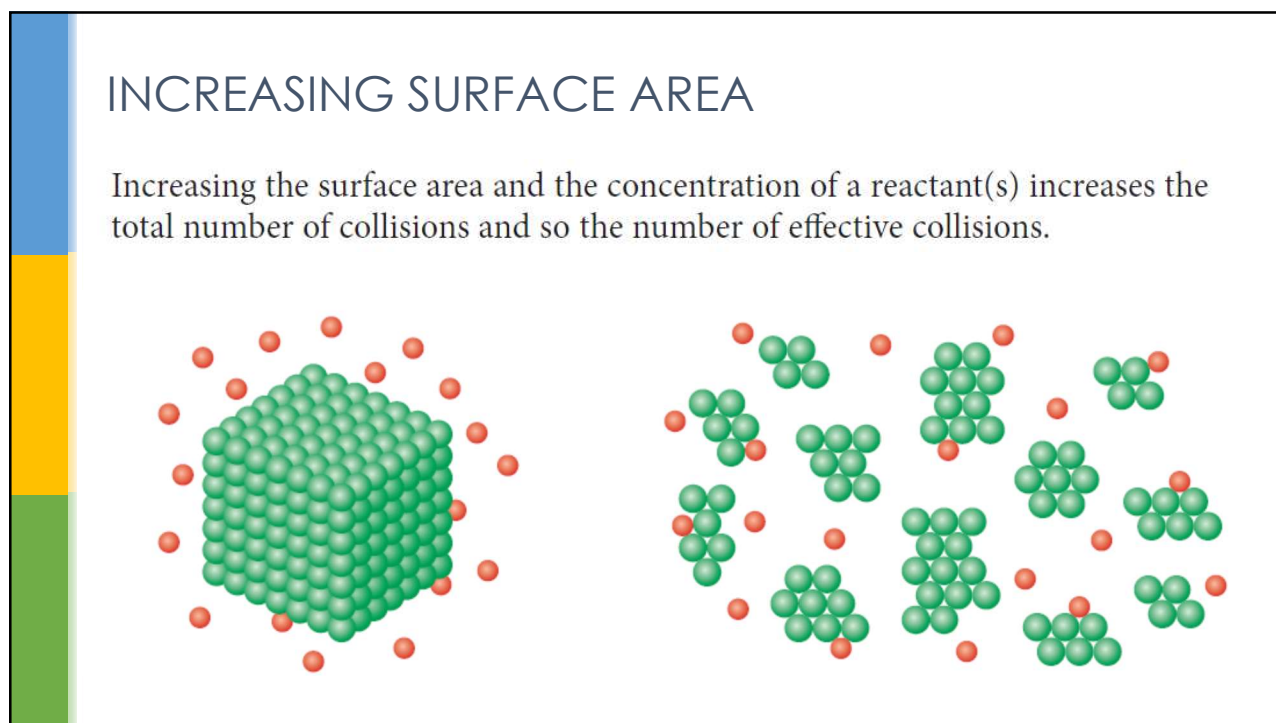
Increasing the temperature will increase the average kinetic energy of the entities of reactant(s). This will result in more entities having a quantity of kinetic energy the same as or greater than the activation energy and will increase the number of collisions.



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## CATALYSTS

**catalyst** a substance that alters the rate of a chemical reaction without itself being permanently changed

**biological catalyst** a catalyst made by a living system



**Figure 5** A catalytic converter converts toxic exhaust emissions from an internal combustion engine into non-toxic substances. A thin layer of the metal catalyst is spread over a honeycomb lattice to increase the surface area of the catalyst, further increasing the reaction rate.

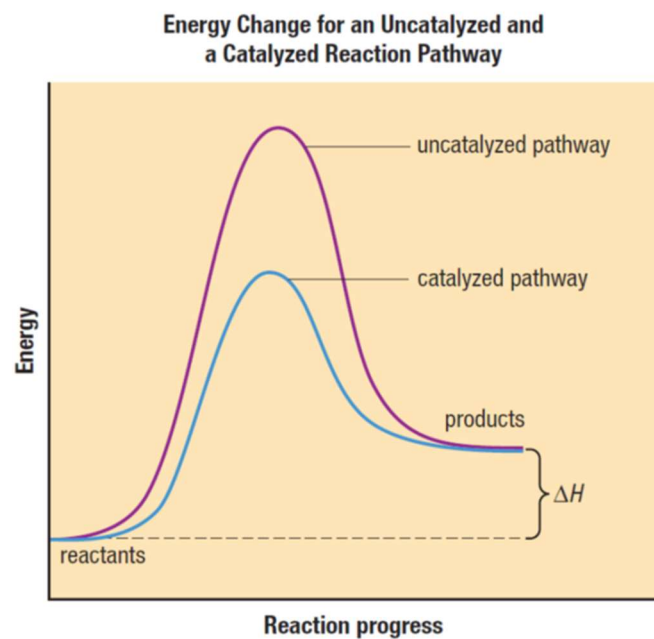


**Figure 6** Enzymes called lipases help blue cheeses to ripen.

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## CATALYSTS

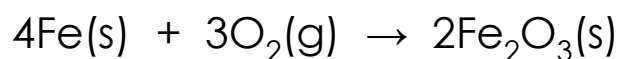
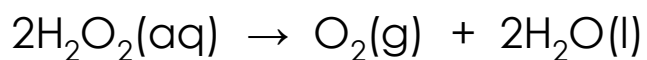
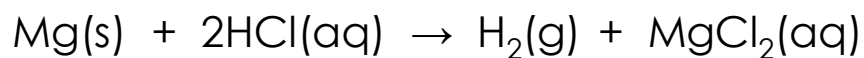
A catalyst provides a reaction pathway with a lower activation energy.



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## EXAMPLE

State three ways to increase the rate of these reactions:



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## SOME HIGH ENERGY BIOCHEMISTRY...

Cellular(Aerobic) Respiration: the process through which cells convert sugars into energy.



TO INCREASE THE RATE OF THIS CHEMICAL REACTION, WE COULD...

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