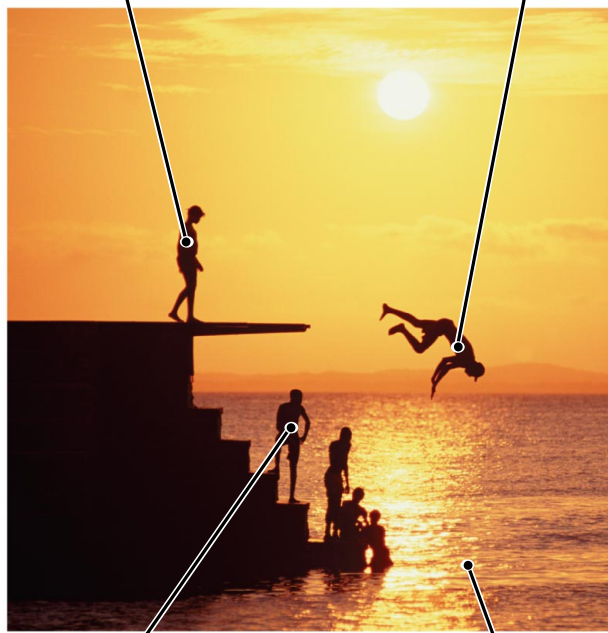


1

A diver has more potential energy on the platform than in the water.

Diving converts potential energy to kinetic energy.

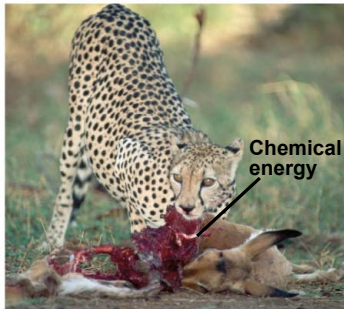


Climbing up converts the kinetic energy of muscle movement to potential energy.

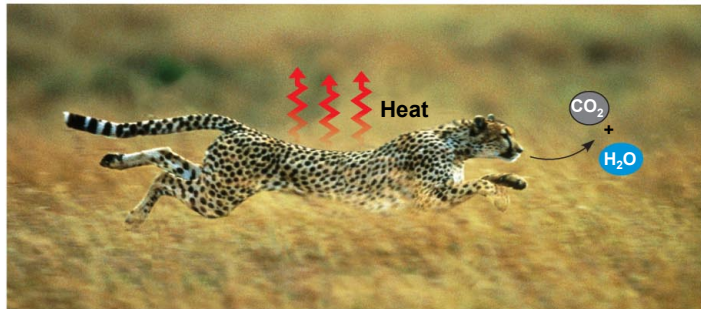
A diver has less potential energy in the water than on the platform.

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2

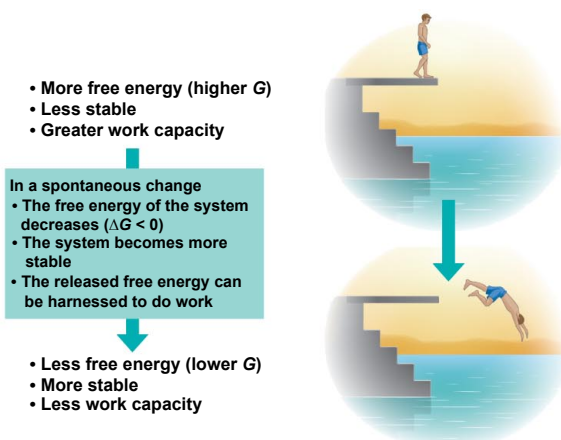


(a) First law of thermodynamics



(b) Second law of thermodynamics

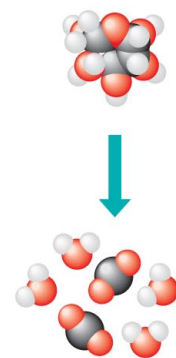
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(a) Gravitational motion

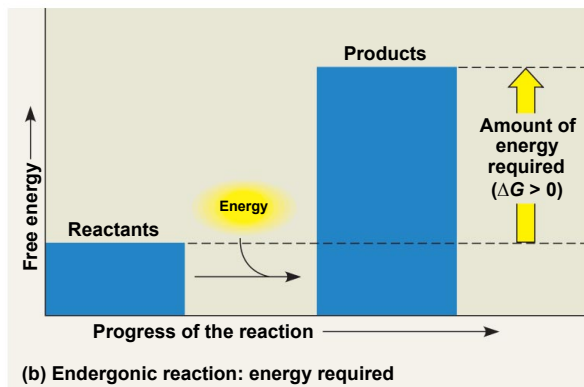
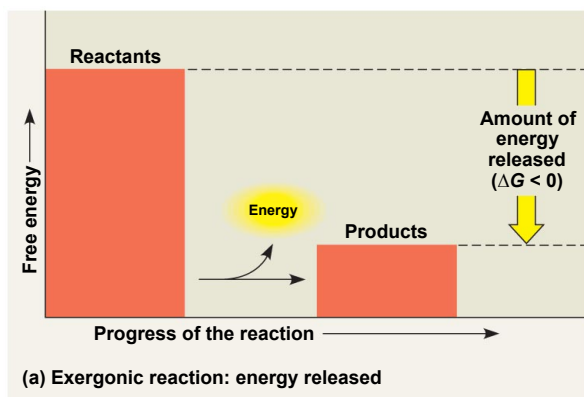


(b) Diffusion



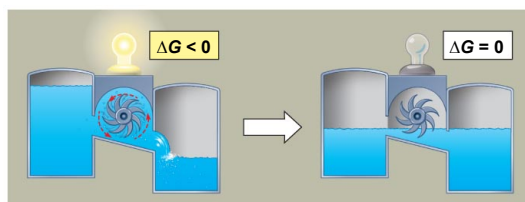
(c) Chemical reaction

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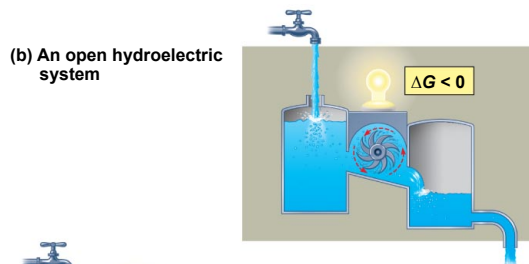


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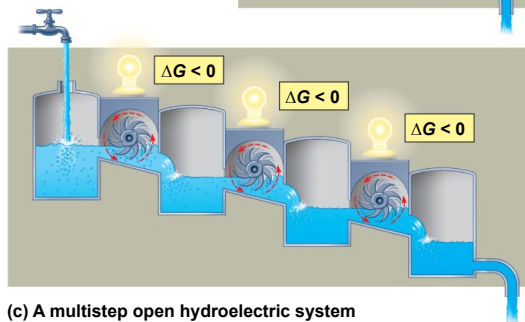
5



(a) An isolated hydroelectric system



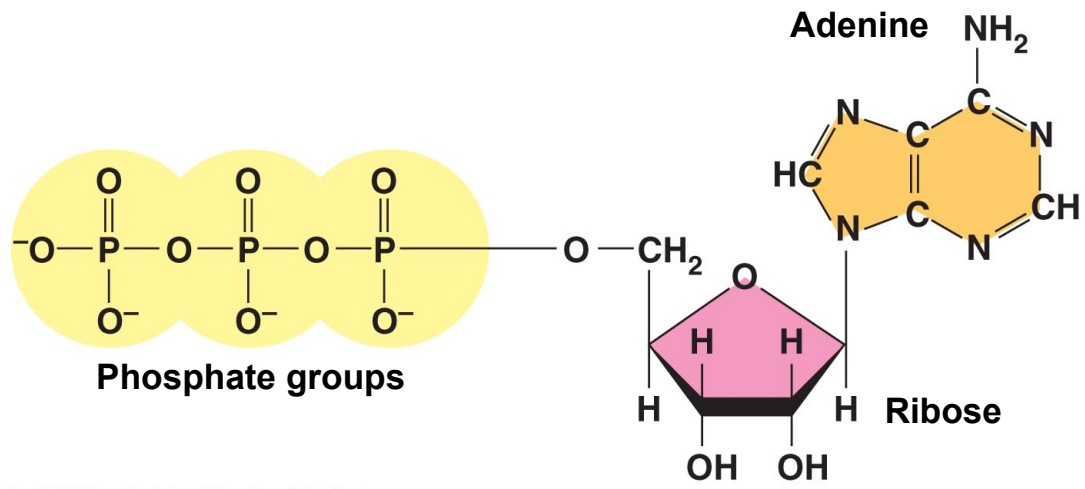
(b) An open hydroelectric system



(c) A multistep open hydroelectric system

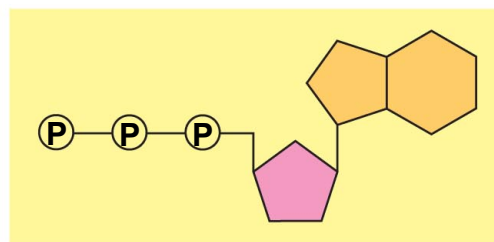
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6

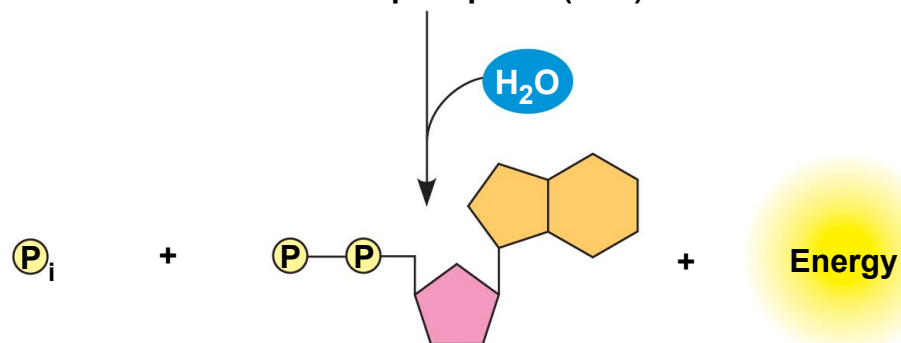


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7



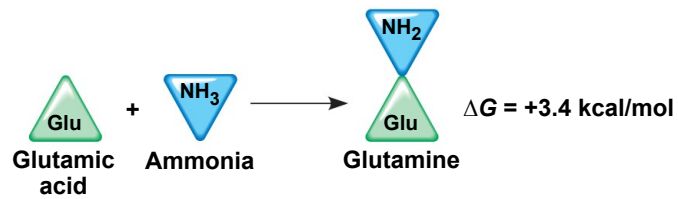
Adenosine triphosphate (ATP)



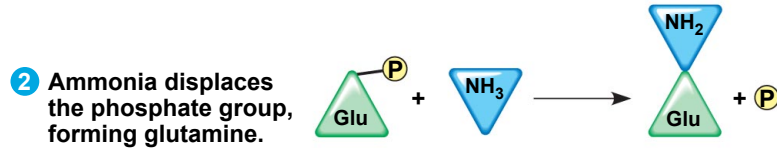
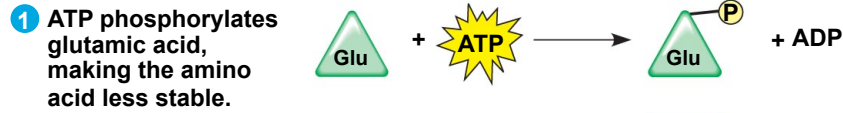
Inorganic phosphate **Adenosine diphosphate (ADP)**

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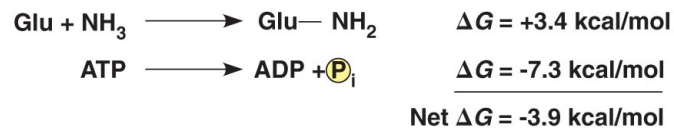
8



(a) Endergonic reaction

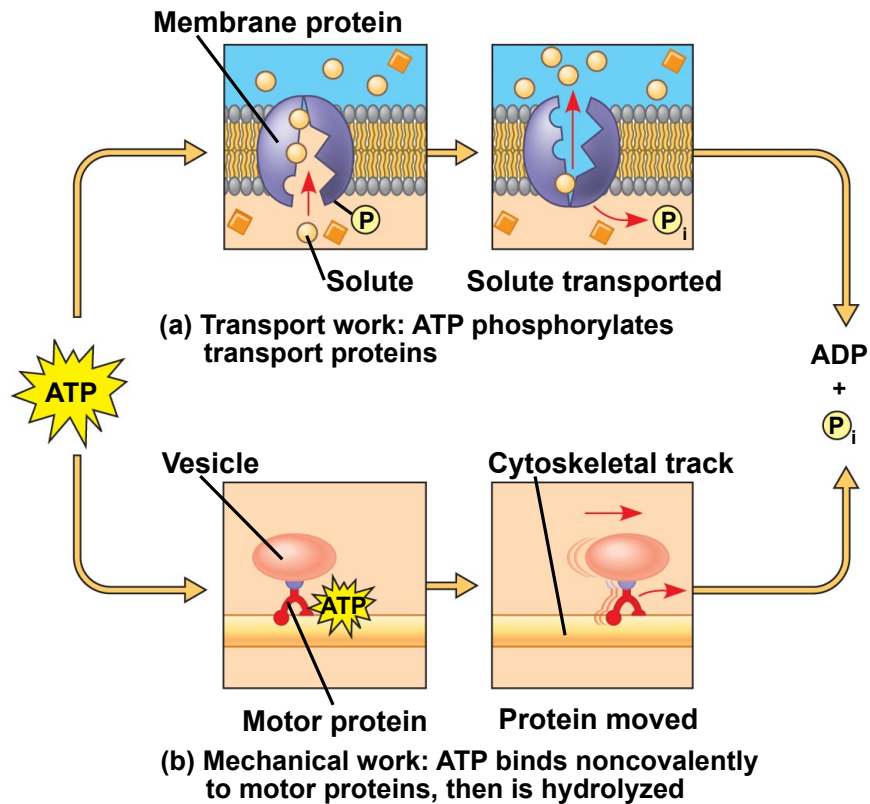


(b) Coupled with ATP hydrolysis, an exergonic reaction

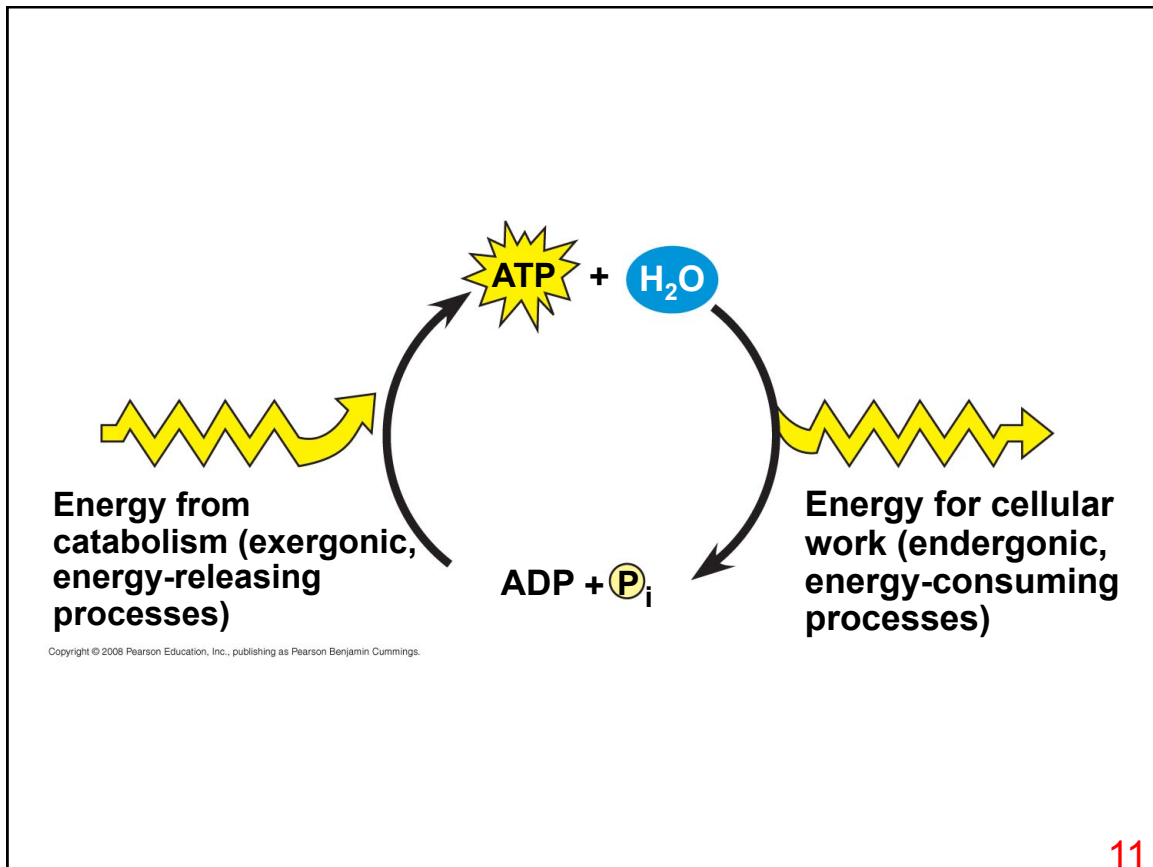


(c) Overall free-energy change

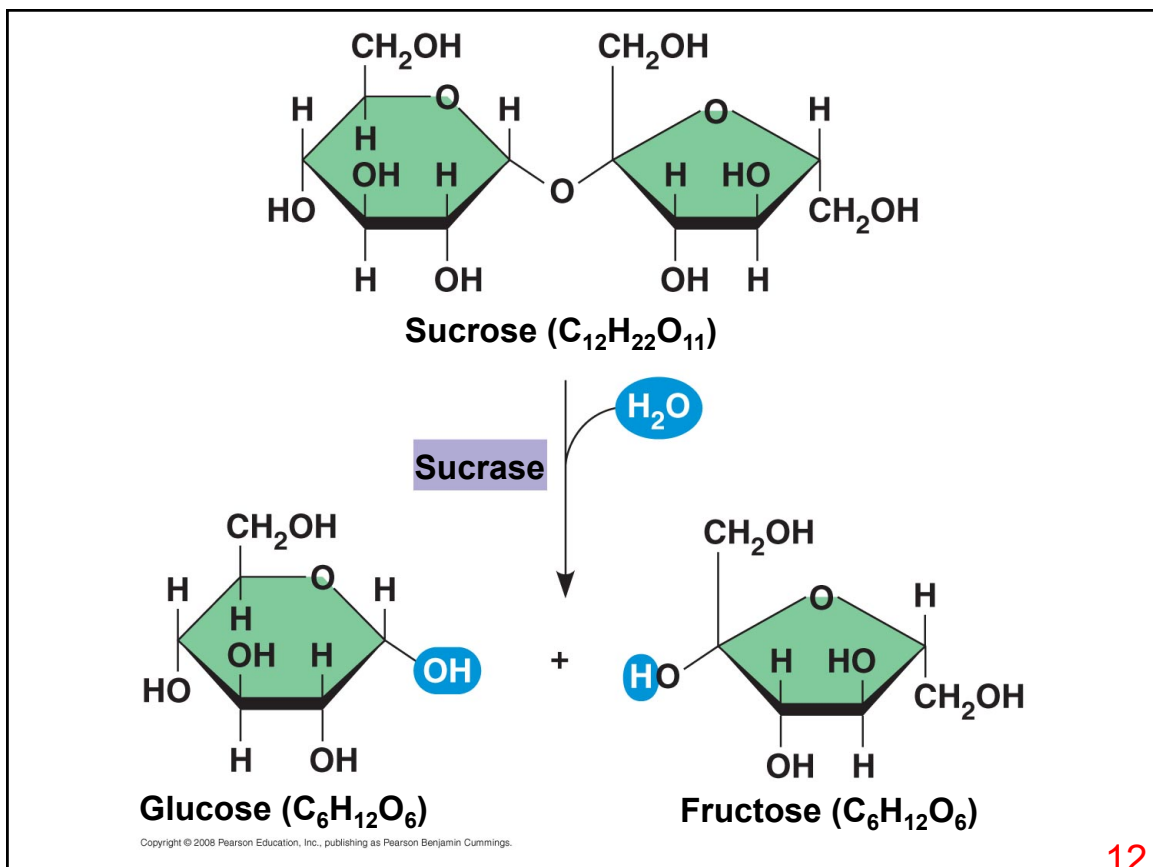
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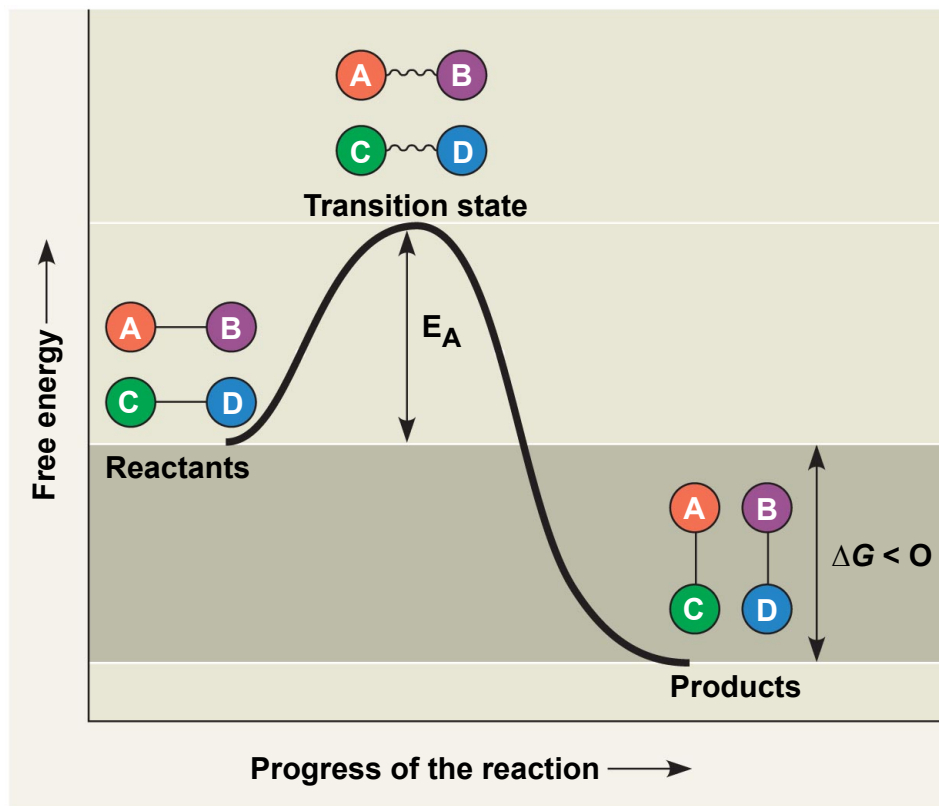
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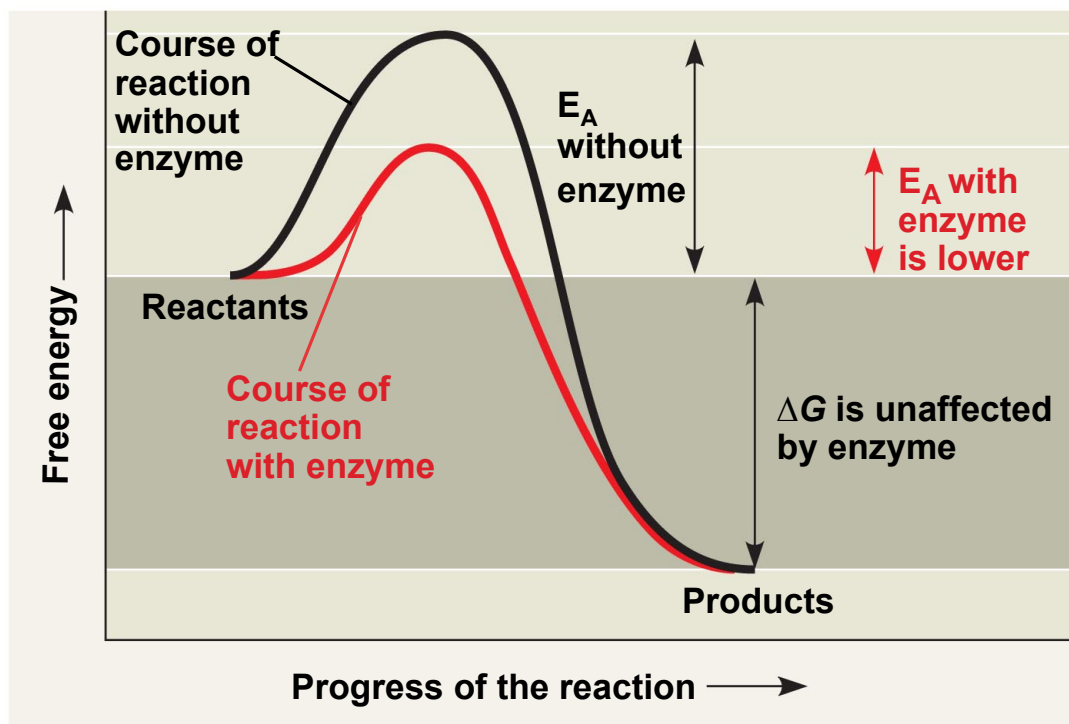


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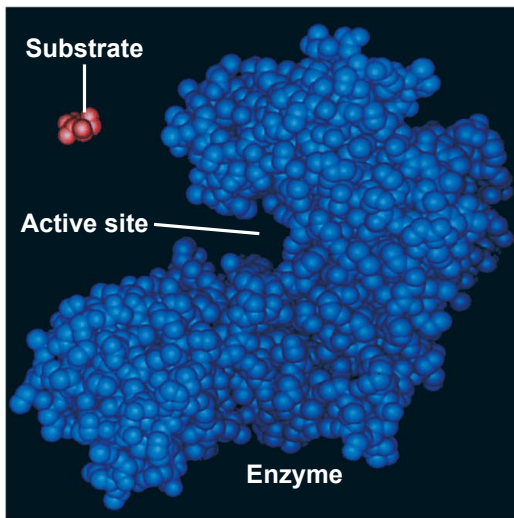
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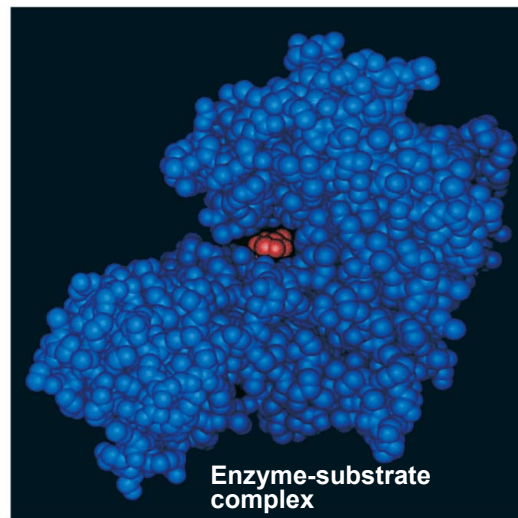
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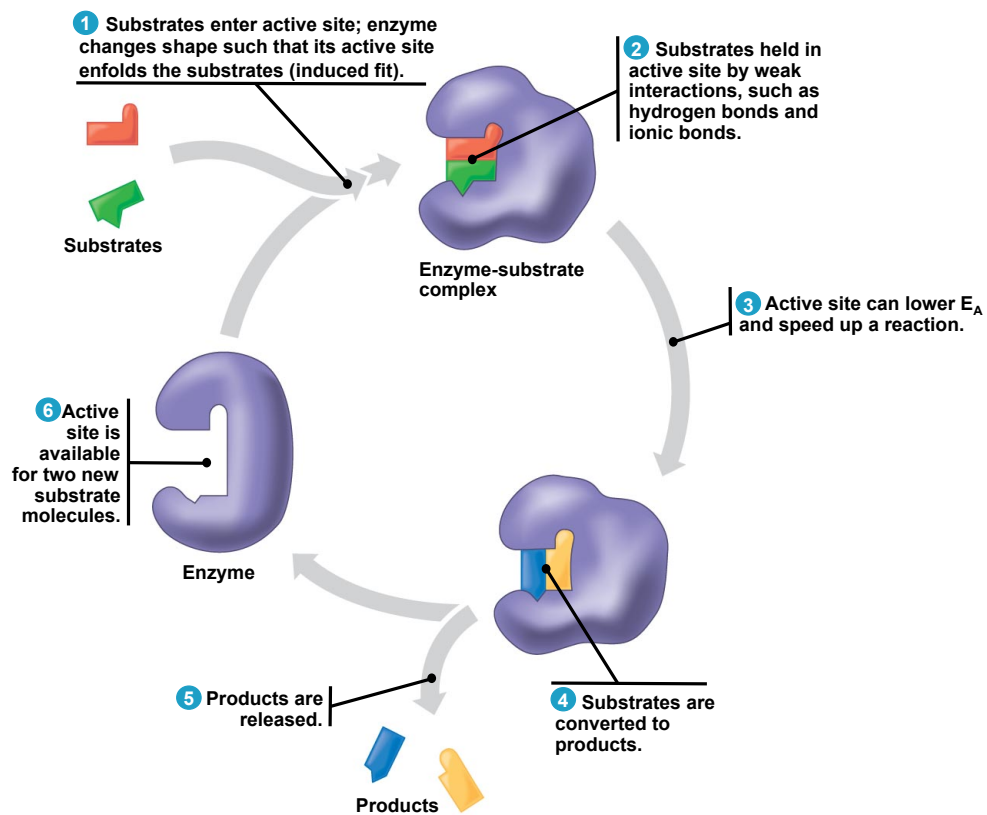
(a)

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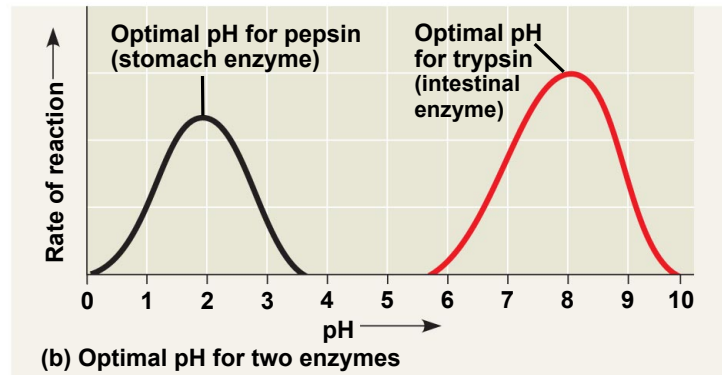
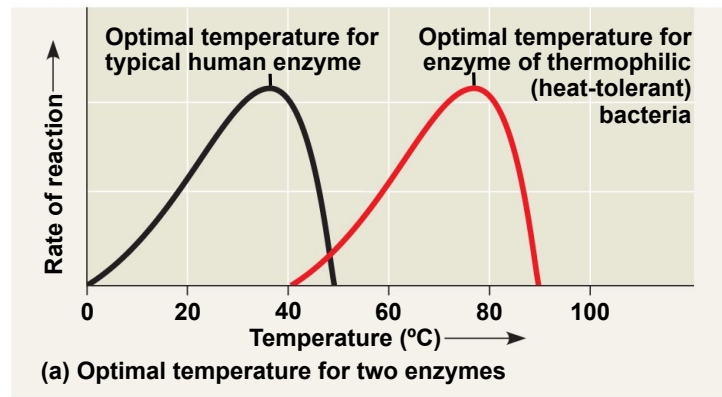
(b)

15



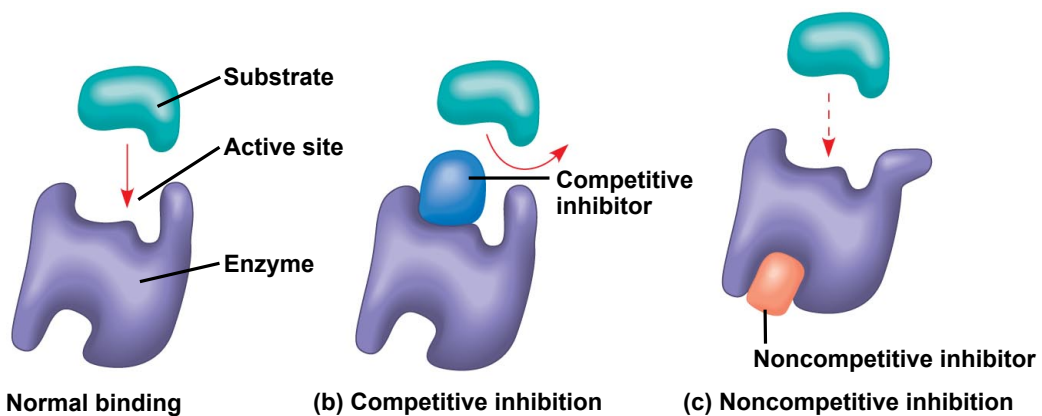
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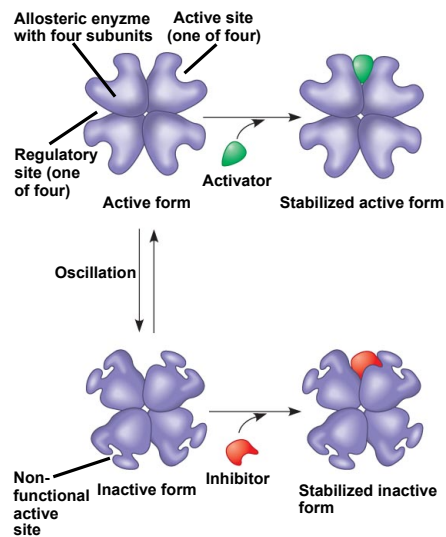
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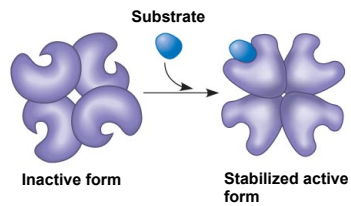


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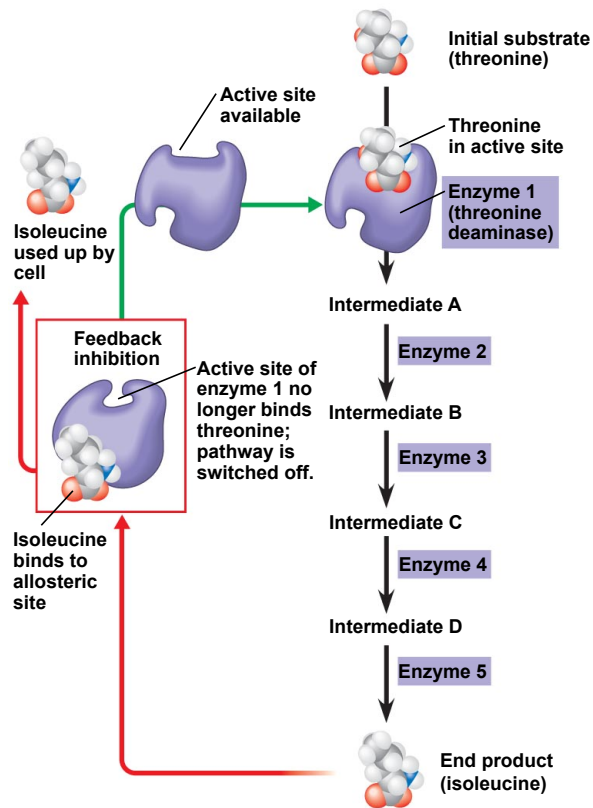


(a) Allosteric activators and inhibitors



(b) Cooperativity: another type of allosteric activation

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