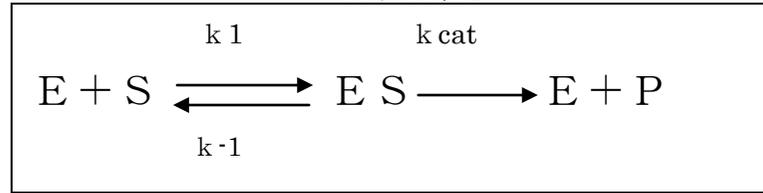


理数生物プリント タンパク質3

●酵素の反応速度の考え方

酵素の反応速度と親和性

ミカエリス・メンテン式の簡単な解説



k_1 は E (酵素) + S (基質) が ES (酵素基質複合体) になる速度
 $k-1$ は ES が E + S に戻る速度
 k_{cat} は ES が E と P (生成物) になる速度

反応速度 V は $V = k_{cat} [E S]$ であらわされる

$$k-1 [E S] + k_{cat} [E S] = k_1 [E] [S]$$

$$[E S] = \frac{k_1}{k-1 + k_{cat}} [E] [S] = \frac{k_1}{k-1 + k_{cat}} ([E_0] - [E S]) [S]$$

$$[E] = [E_0] - [E S]$$

$E + S \rightleftharpoons ES$ の反応が平衡に達しているとする

$$k_m = \frac{[E] [S]}{[E S]}$$

これを
酵素の親和性という

$$k_{cat} \frac{k_1}{k-1 + k_{cat}} [E] [S] = V$$

$$k_m = \frac{k-1 + k_{cat}}{k_1}$$

$$[E S] = \frac{[E_0] [S]}{k_m + [S]}$$

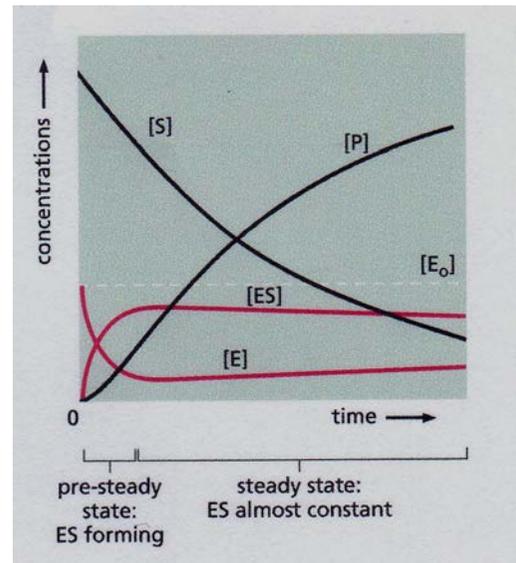
$$V = k_{cat} [E S]$$

ミカエリス・メンテン式

$$V = \frac{k_{cat} [E_0] [S]}{k_m + [S]}$$

酵素の最大反応速度 $V_{max} = k_{cat} [E_0]$

$$V = \frac{V_{max} [S]}{k_m + [S]}$$



代謝とタンパク質

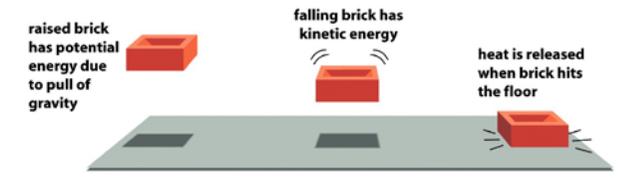
●代謝とエネルギー

エネルギーの種類と変換

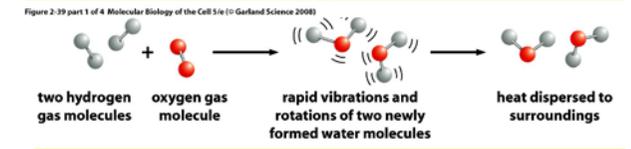
代謝 metabolism

anabolism =

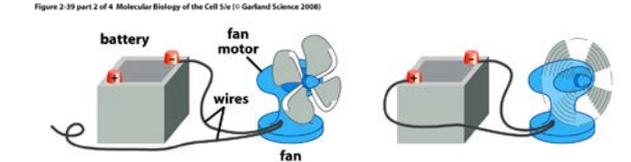
catabolism =



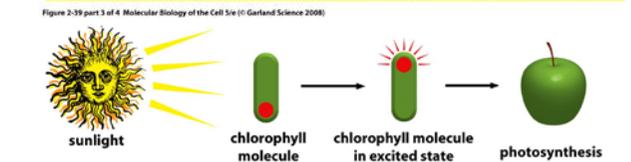
potential energy due to position → kinetic energy → heat energy



chemical bond energy in H₂ and O₂ → rapid molecular motions in H₂O → heat energy



chemical bond energy → electrical energy → kinetic energy



electromagnetic (light) energy → high energy electrons → chemical bond energy

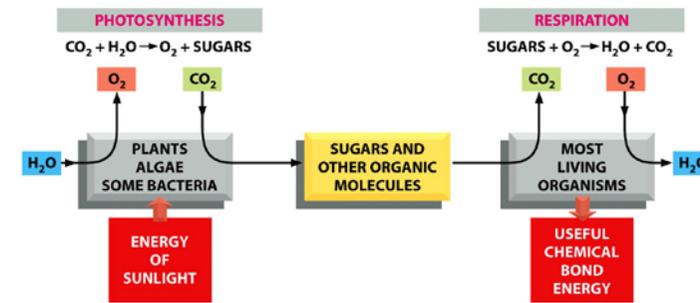


Figure 2-41 Molecular Biology of the Cell 5/e (© Garland Science 2008)

autotrophism =

heterotrophism =

ATP

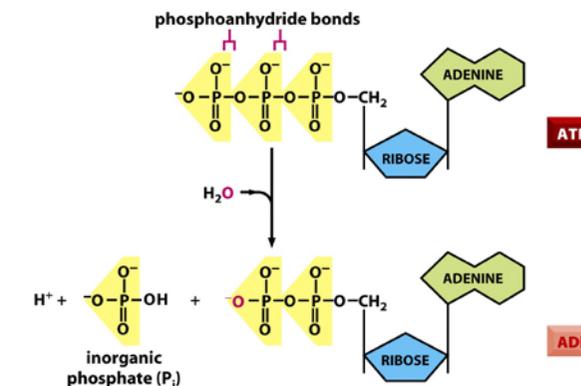


Figure 2-57 Molecular Biology of the Cell 5/e (© Garland Science 2008)

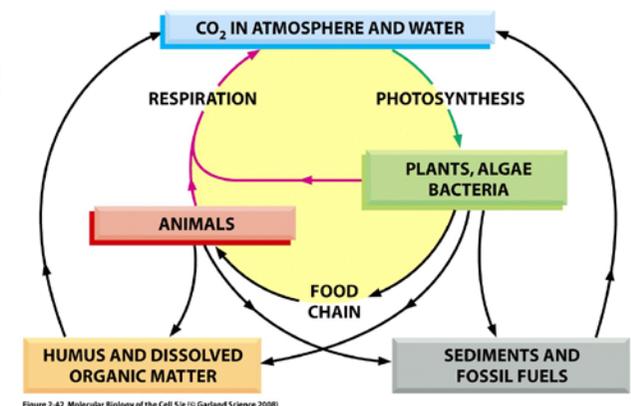


Figure 2-42 Molecular Biology of the Cell 5/e (© Garland Science 2008)