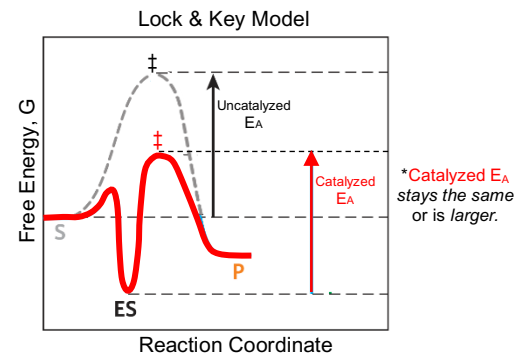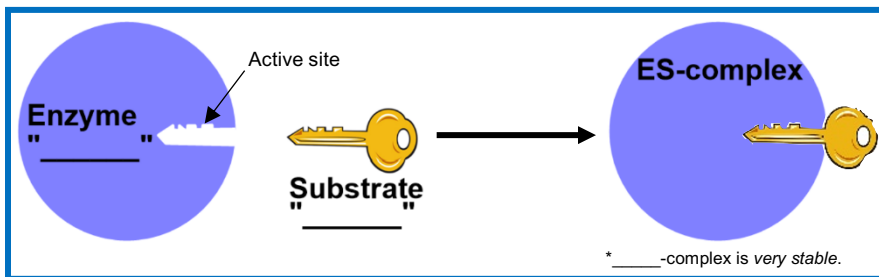## CONCEPT: LOCK & KEY VS INDUCED FIT MODELS

● There are _____ main models for enzyme-substrate specificity.

1) _Lock & Key Model_**:** active site shape is _rigid_ & _complementary_ to the _____ shape for a perfect "puzzle-piece" fit.

　□ _____ _likely_ model for enzyme catalysis since ES-complex is stabilized & E_A stays the _same_ or _increases_.
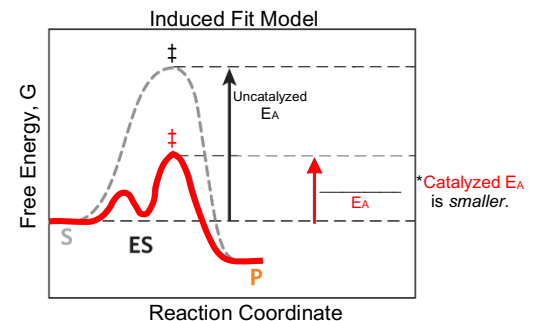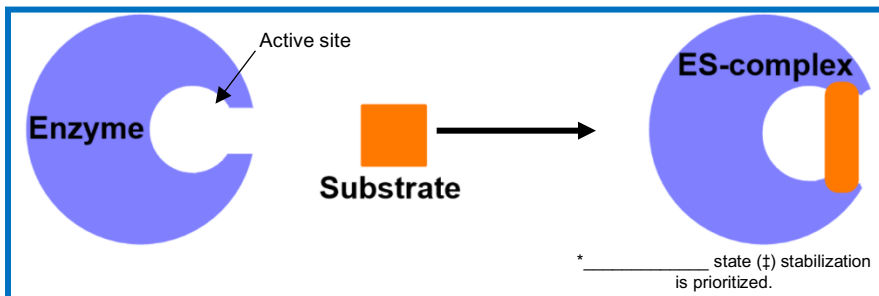
EXAMPLE: Lock & Key Model.

Lock & Key Model

2) _Induced Fit Model_**:** active site shape is _adjustable_ & more _complementary_ to the _____ state (‡) to stabilize it.

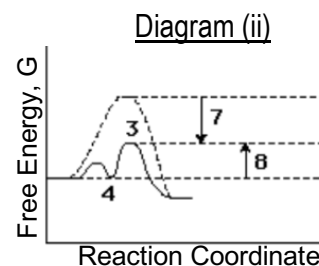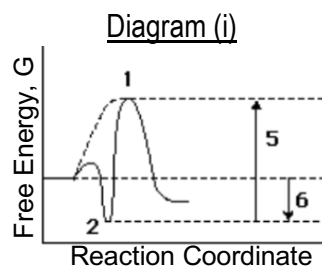　□ Conformational changes _induced_ in active site & substrate.

　□ _____ _likely_ model for enzyme catalysis since ES-complex is _____ stabilized & E_A _decreases_.

EXAMPLE: Induced Fit Model.

Induced Fit Model

PRACTICE: Compare the two enzyme-catalyzed reaction diagrams below (i & ii) to determine which of the following is true.

　a) The ES-complex in diagram (i) is #2 and in diagram (ii) is #3..

　b) Catalyzed E_A in diagram (i) is arrow #5 and in diagram (ii) is arrow #7.

　c) Binding energy in diagram (i) is arrow #5 and in diagram (ii) is arrow #7.

　d) Diagram (i) describes a "lock & key" model while (ii) describes more of an "induced fit" model.

Diagram (i)

Diagram (ii)

PRACTICE: What is a potential disadvantage for an enzyme having too high of an affinity for its substrate?

a) Enzyme catalysis may not occur.

b) The enzyme would catalyze the reaction but remain covalently & permanently linked to the product.

c) The ES complex could end up in a large energy trough with a consequentially large E_A to the transition state.

d) There's no potential disadvantage to strong affinity. The stronger the affinity, the faster/better the catalysis.

e) a, b and c.

f) a and c.

PRACTICE: Select the best option that fills in the blanks appropriately in the order of their appearance.

The left graph depicts an energy diagram for the "_____" model of enzyme-substrate specificity, whereas the right diagram depicts an energy diagram for the modern "_____" model. In the lock & key model, the enzyme binds tightly and precisely to the "_____." In the induced fit model, the enzyme binds weakly to the "_____" and then changes conformation to bind tightly to the "_____."

a) Lock & Key ; Induced fit ; transition state ; substrate ; product.

b) Lock & Key ; Induced fit ; substrate, transition state ; product.

c) Lock & Key ; Induced fit ; substrate; substrate; transition state.

d) Induced fit ; Lock & Key ; transition state; product; substrate.

e) Induced fit ; Lock & Key ; product; transition state; substrate.

f) Induced fit ; Lock & Key ; substrate ; product; transition state.