

E



***ORANIZATION  
INCREASES***



***ENTROPY  
DECREASES***



# *HOMEOSTASIS*



# ENZYMES DENATURATION

# **ENZYME DENATURES**

**ENZYME DENATURES**



**CONFORMATION  
CHANGE**

**ENZYME DENATURES**

# ENZYME DENATURES

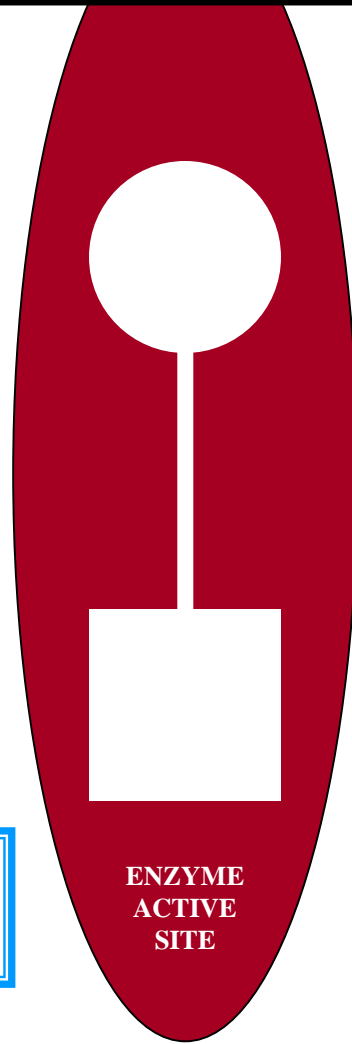


**SUBSTRATE**

# ENZYZME DENATURES



**SUBSTRATE**



ENZYZME  
ACTIVE  
SITE

**ENZYZME CONFORMATION**

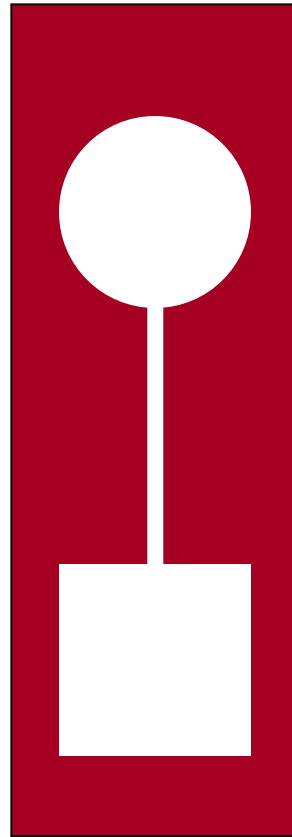
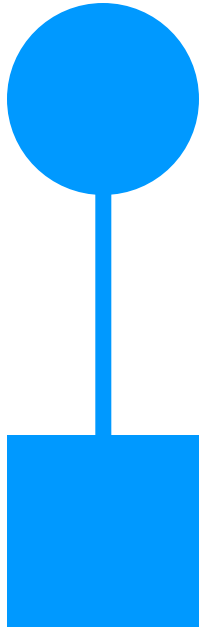
**ENZYZME**



# ENZYME DENATURES

AS

+



**SUBSTRATE**

**CHANGE ENZYME CONFORMATION**

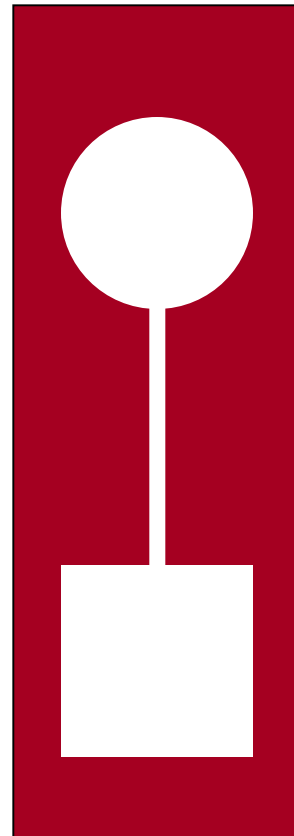
**ENZYME**

# ENZYME DENATURES

CC



**SUBSTRATE**



**ACTIVE  
SITE**

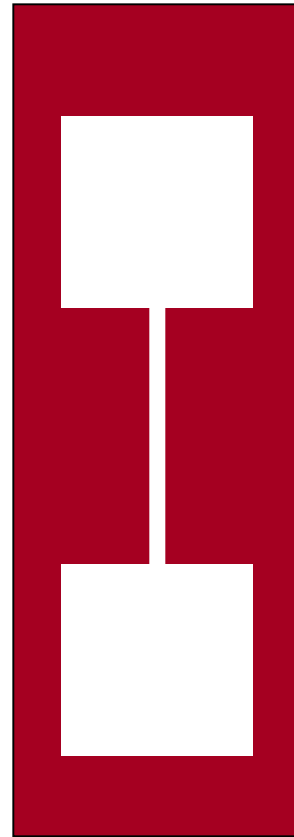
**CHANGE ENZYME CONFORMATION**

**ENZYME**

# ENZYME DENATURES



**SUBSTRATE**



**ACTIVE  
SITE**

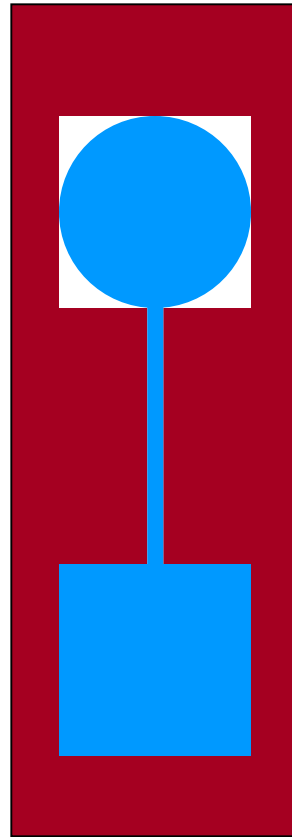
**CHANGE ACTIVE SITE CONFORMATION**

**ENZYME**



# ENZYME DENATURES

N



ACTIVE  
SITE

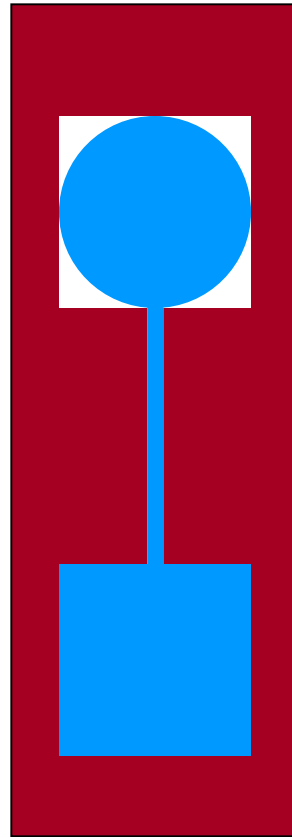
SUBSTRATE

CHANGE ACTIVE SITE CONFORMATION

ENZYME

# ENZYME DENATURES

N



NO SUB/ENZ  
INTERACTION

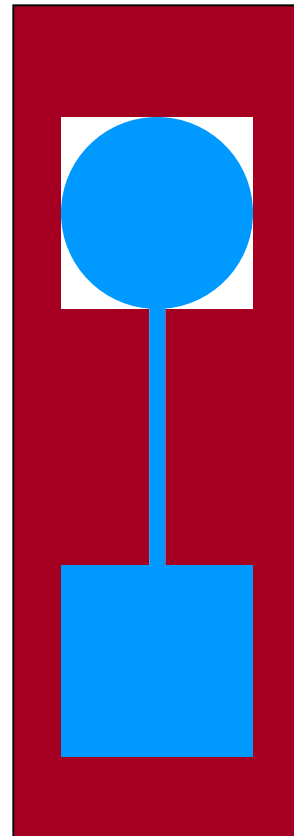
**SUBSTRATE**

**CHANGE ACTIVE SITE CONFORMATION**

**ENZYME**

# ENZYME DENATURES

L



NO  
PRODUCT  
OUTPUT

SUBSTRATE

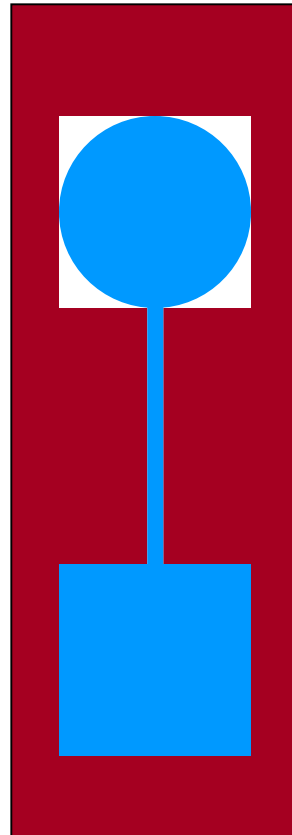
CHANGE ACTIVE SITE CONFORMATION

ENZYME

# ENZYLE DENATURES

ES

?



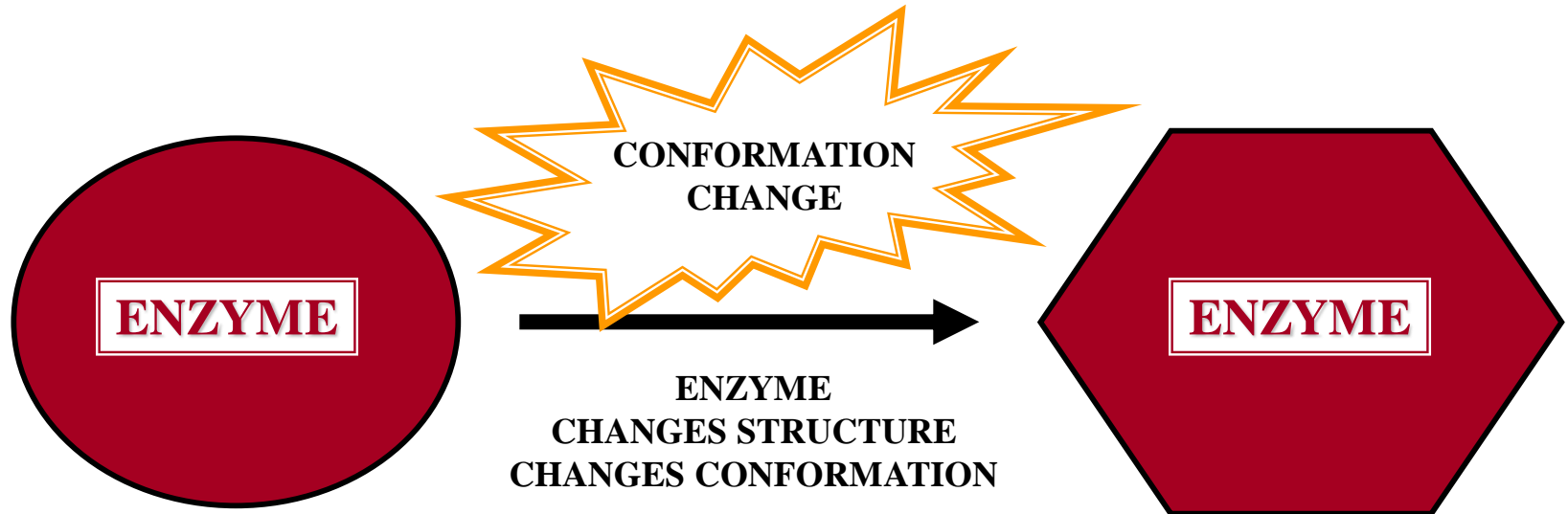
**LOST  
ENZYLE  
FUNCTION**

**SUBSTRATE**

**CHANGE ACTIVE SITE CONFORMATION**

**ENZYLE**

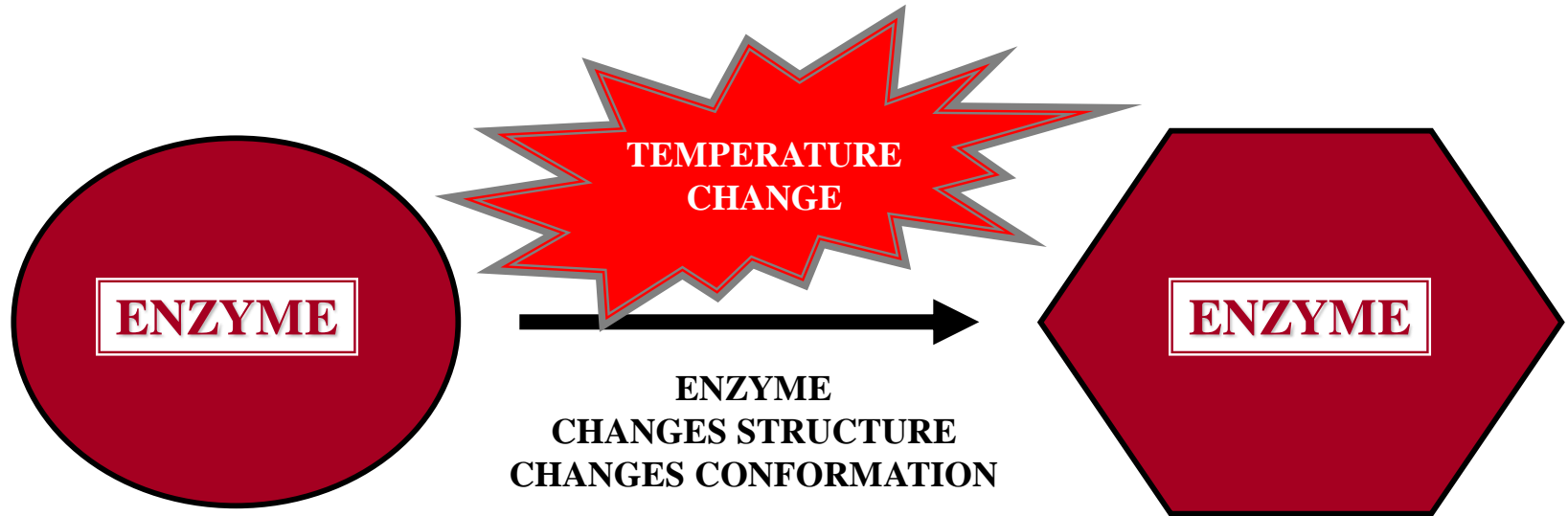
# ENZYME DENATURES



**ENZYMES SENSITIVE:**



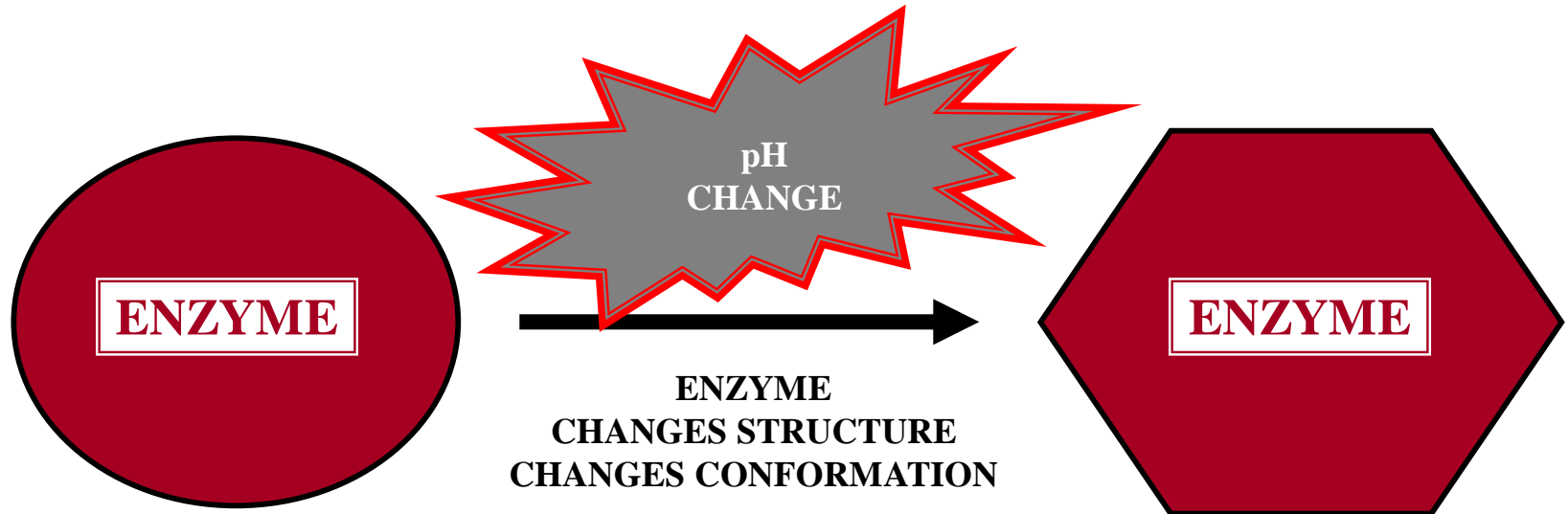
# ENZYME DENATURES




**ENZYMES SENSITIVE:**  
**TEMPERATURE CHANGE**



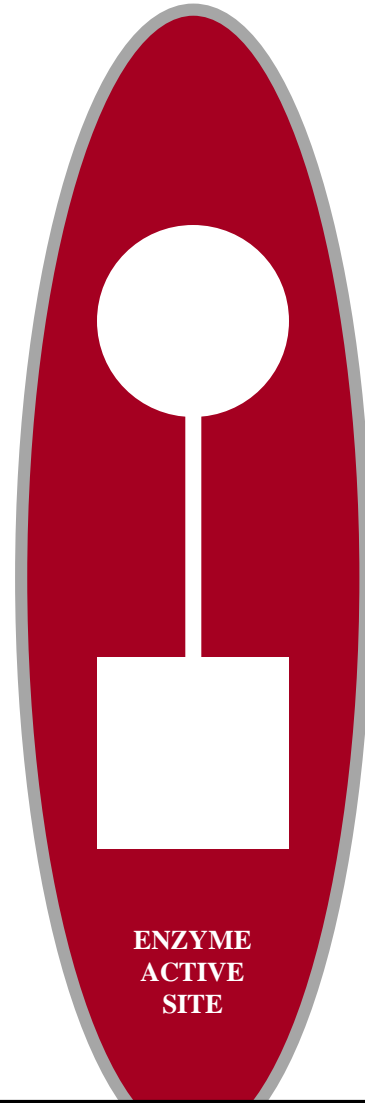
# ENZYME DENATURES



**ENZYMES SENSITIVE:**  
**pH CHANGE**

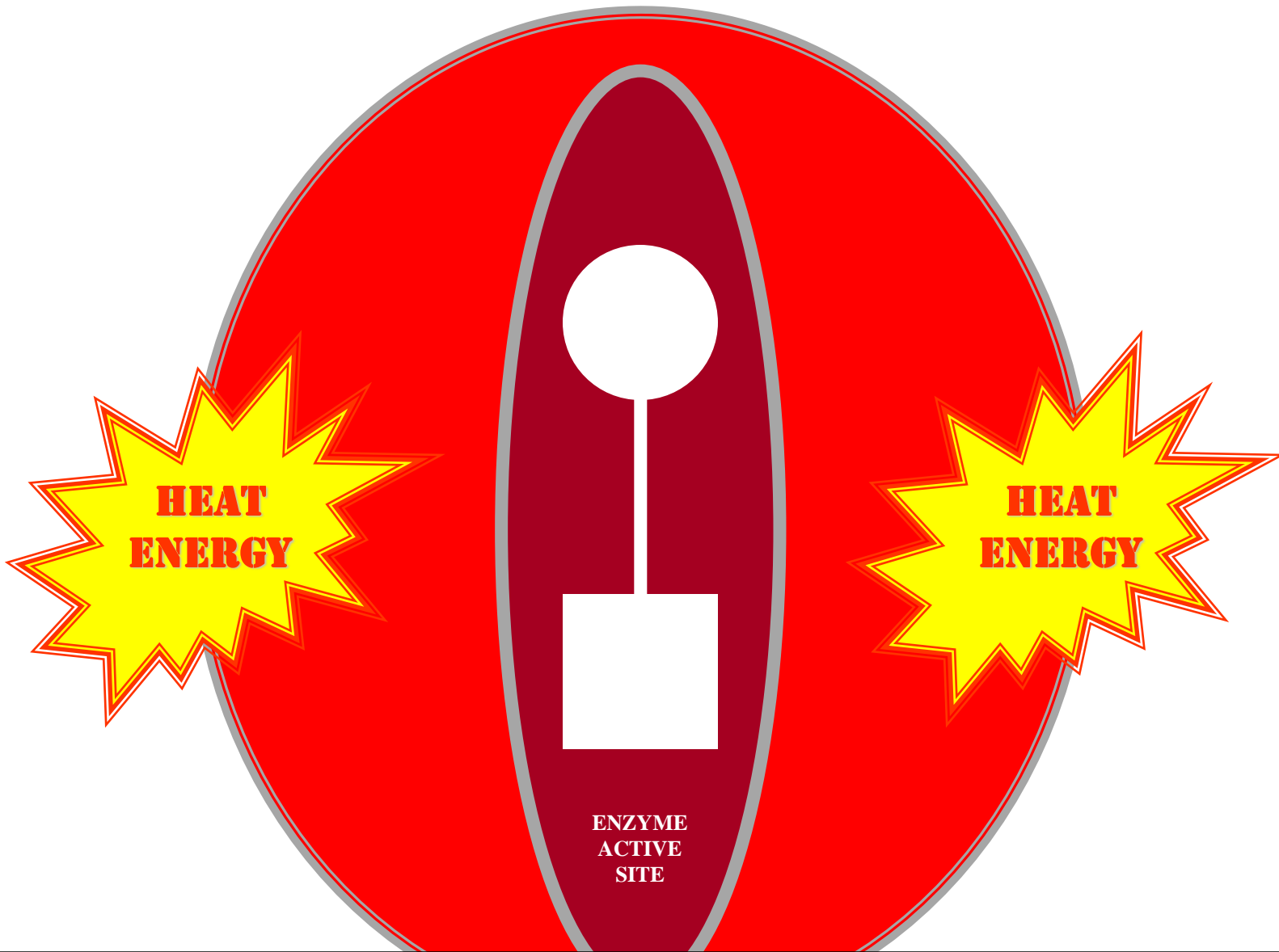


**ENZYME  
DENATURES  
TEMPERATURE  
CHANGE**

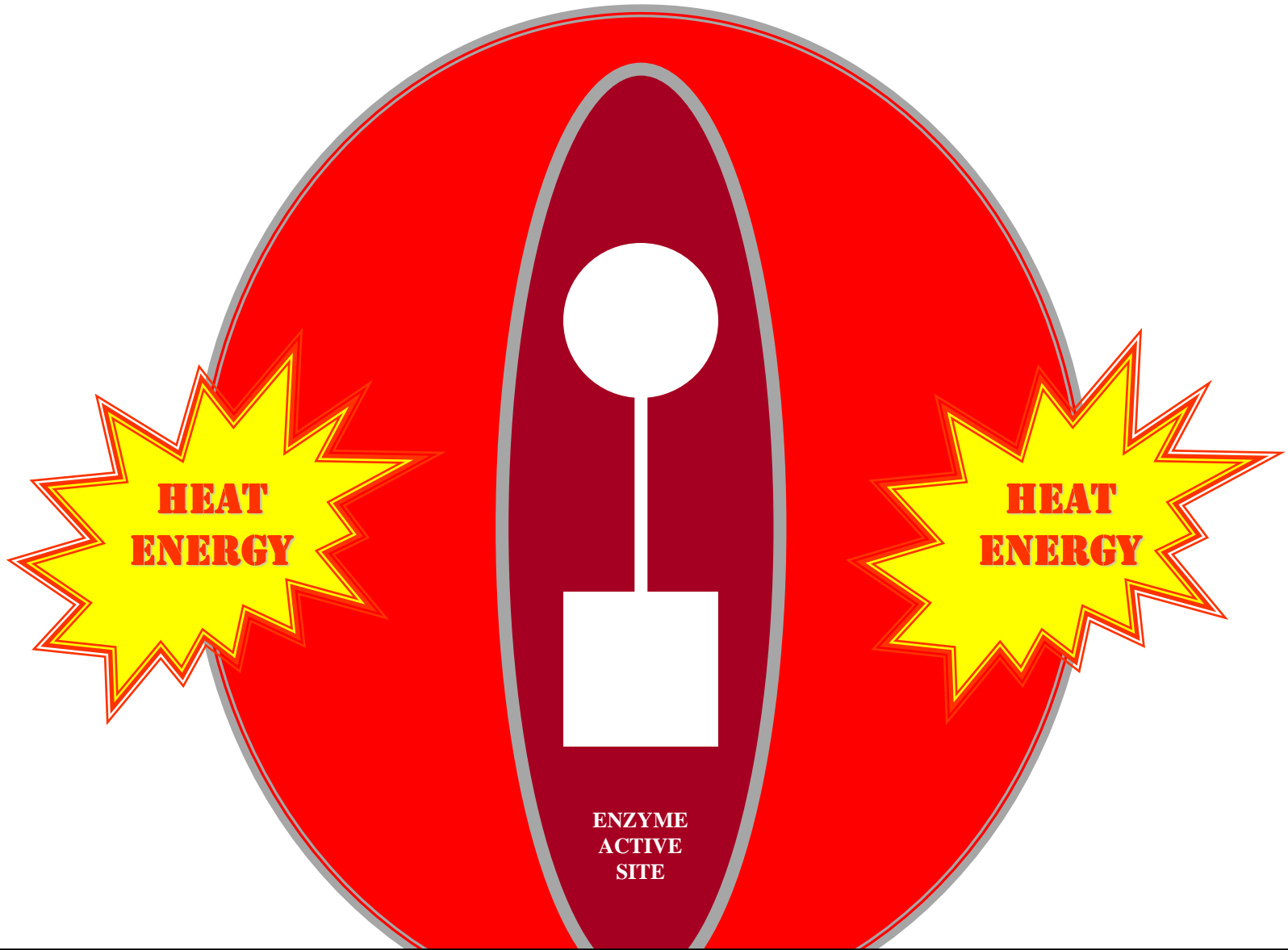


ENZYME  
ACTIVE  
SITE

**ENZYME**



**TEMPERATURE INCREASE**

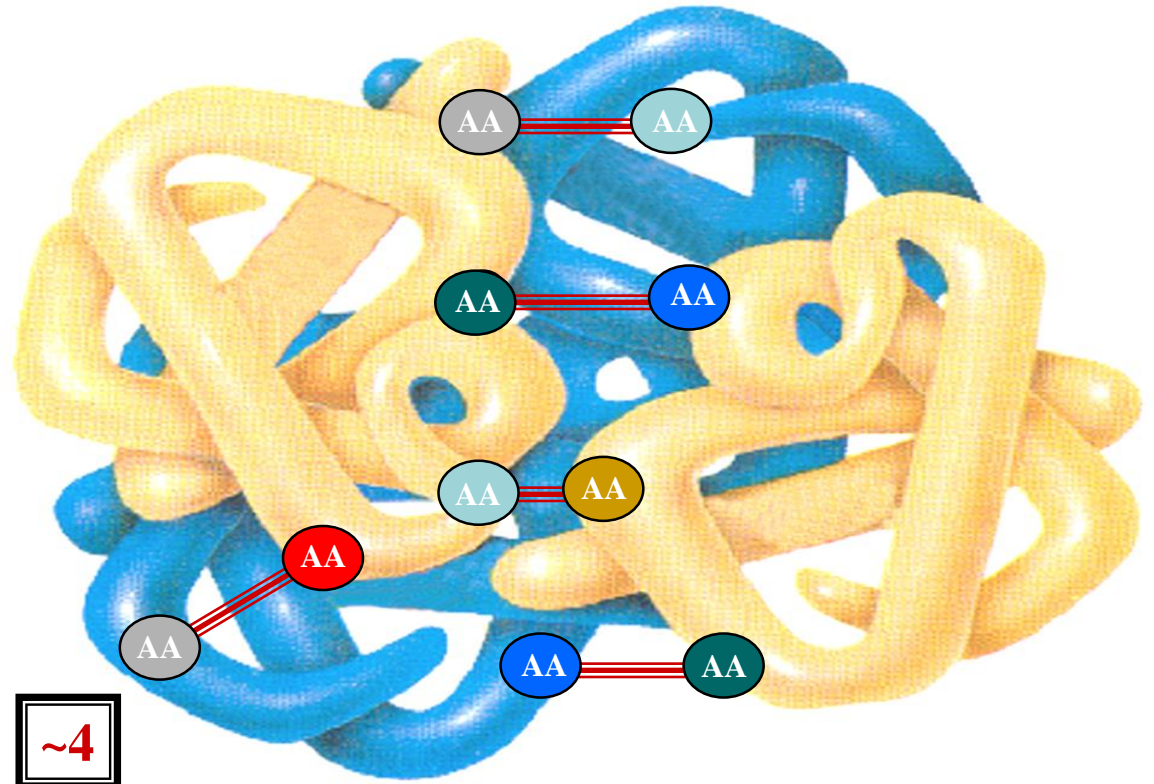


**INCREASE MOLECULAR MOVEMENT**

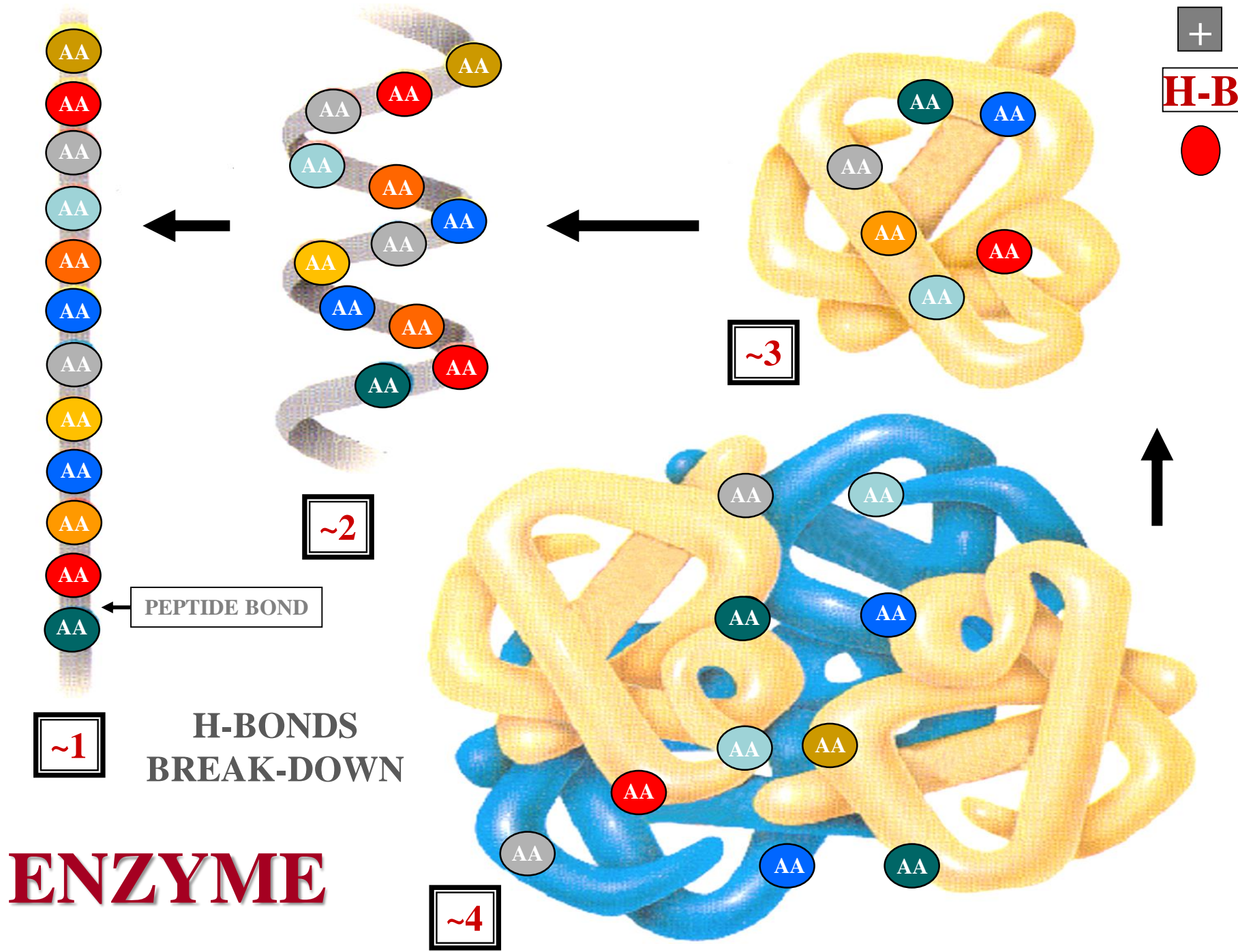
# TEMPERATURE INCREASE INCREASES ENZYME MOLECULAR MOVEMENT

## ENZYME

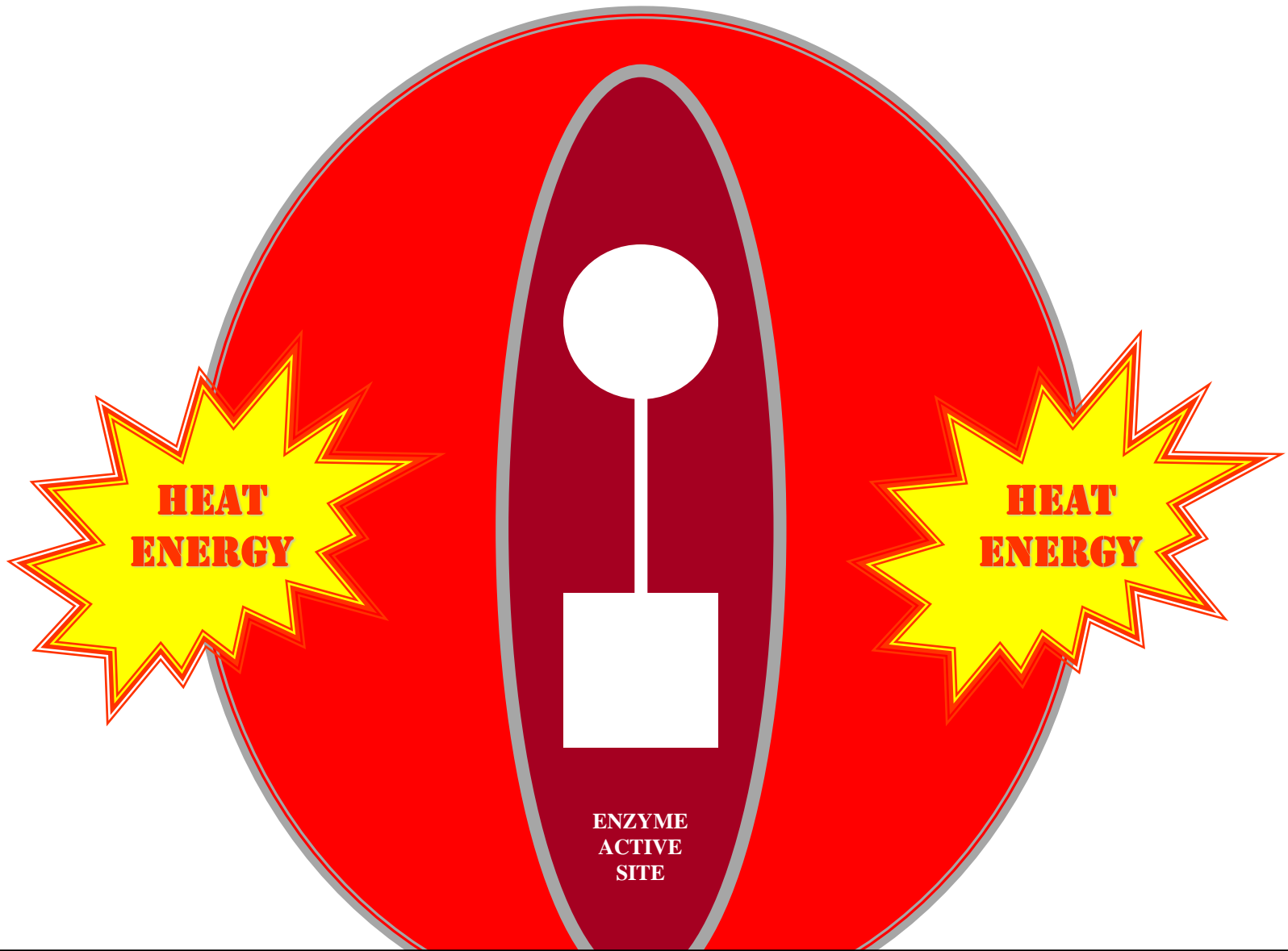
H-BONDS  
WEAK BONDS



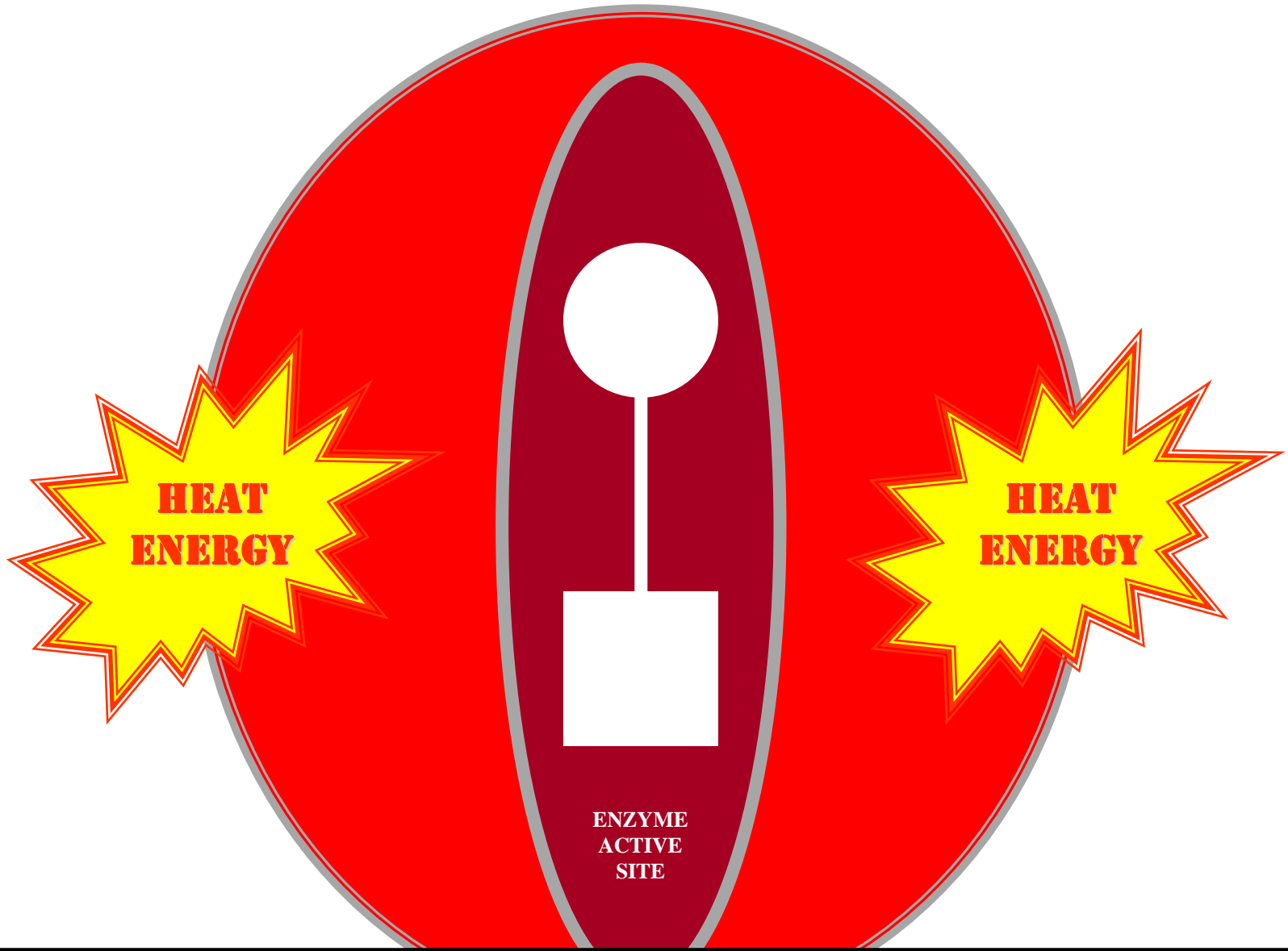
==== = H-BOND



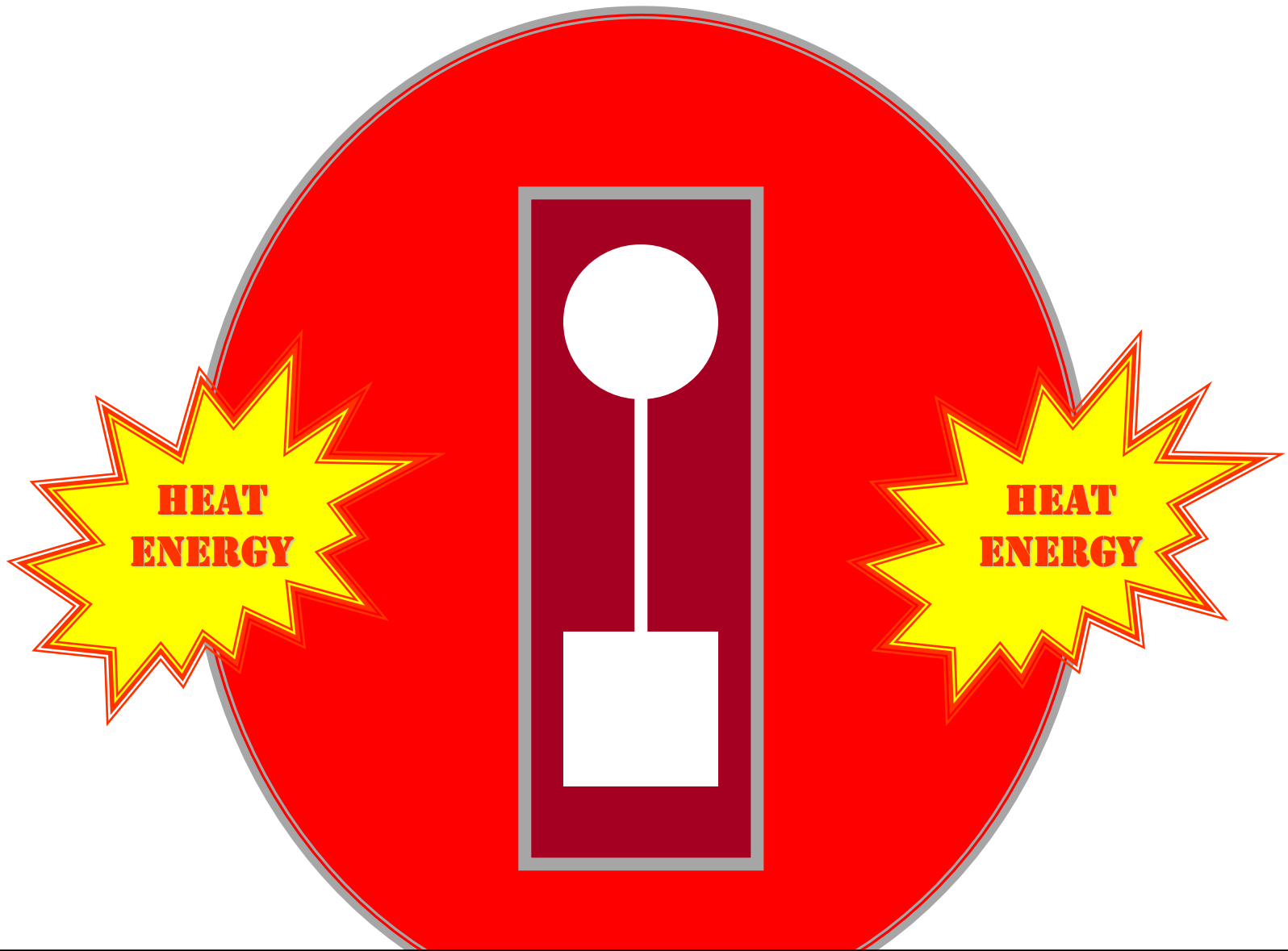




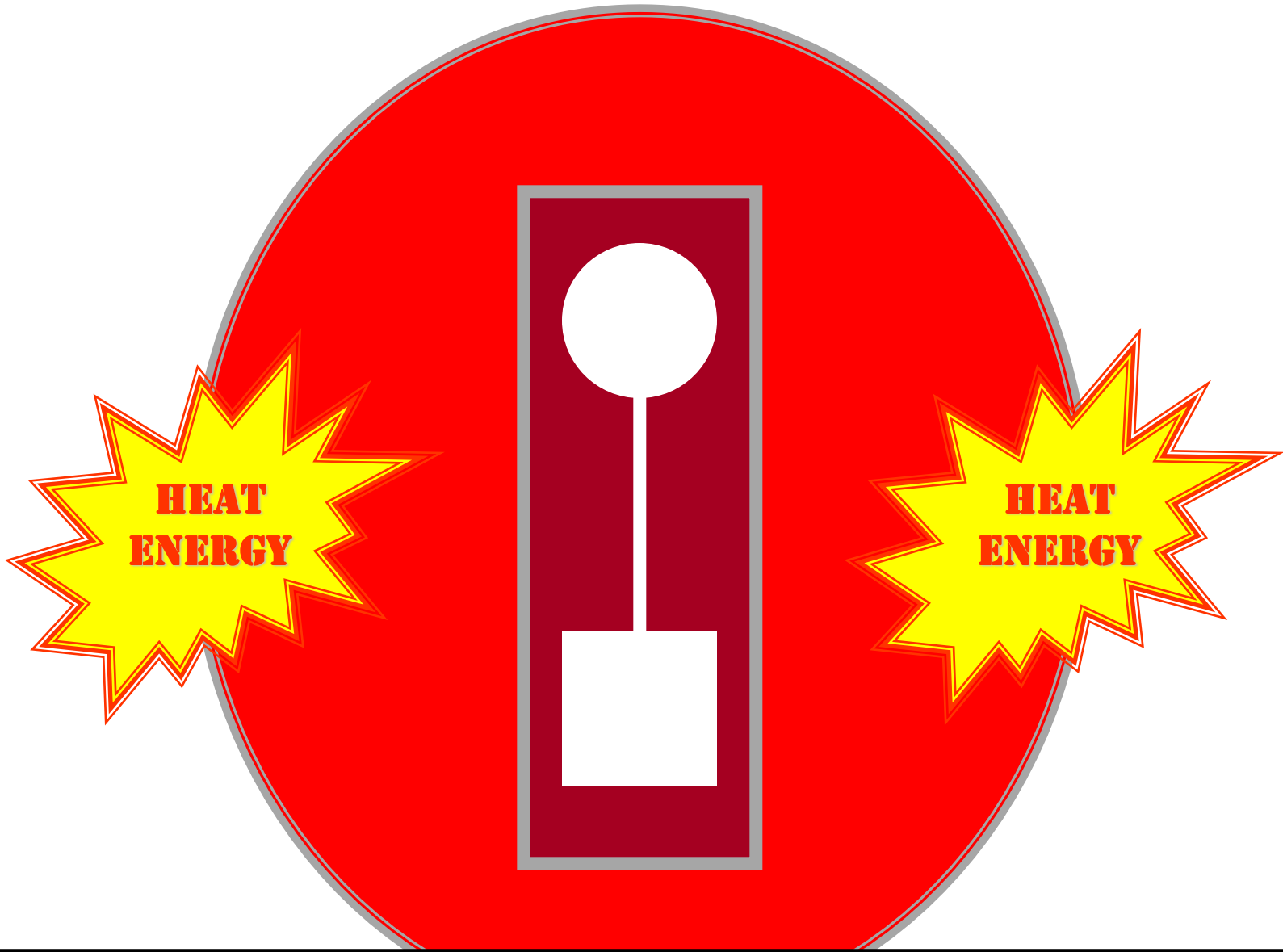
# H-BONDS BREAK-DOWN



**ENZYME**



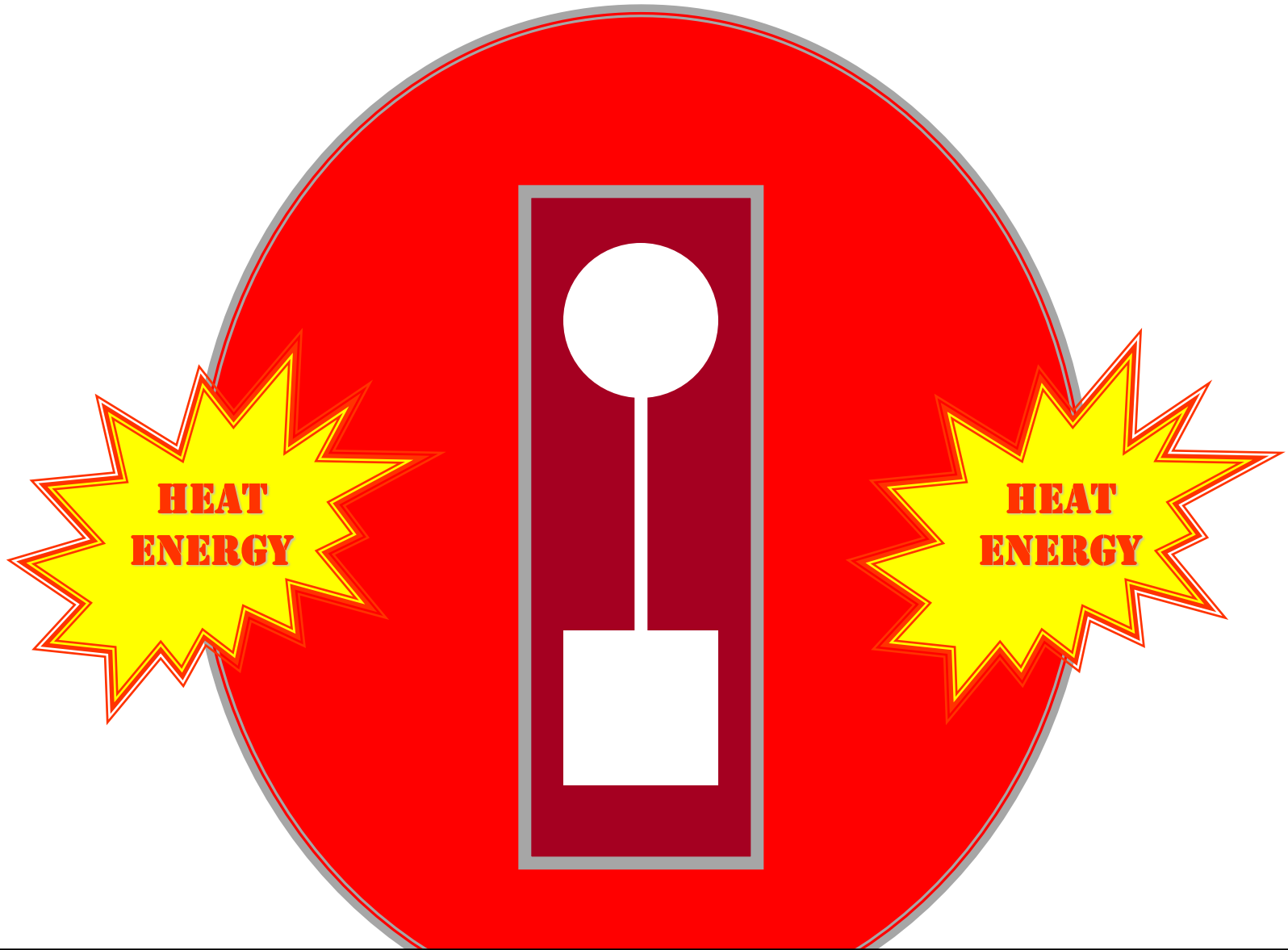
**ENZYME CHANGES CONFORMATION**



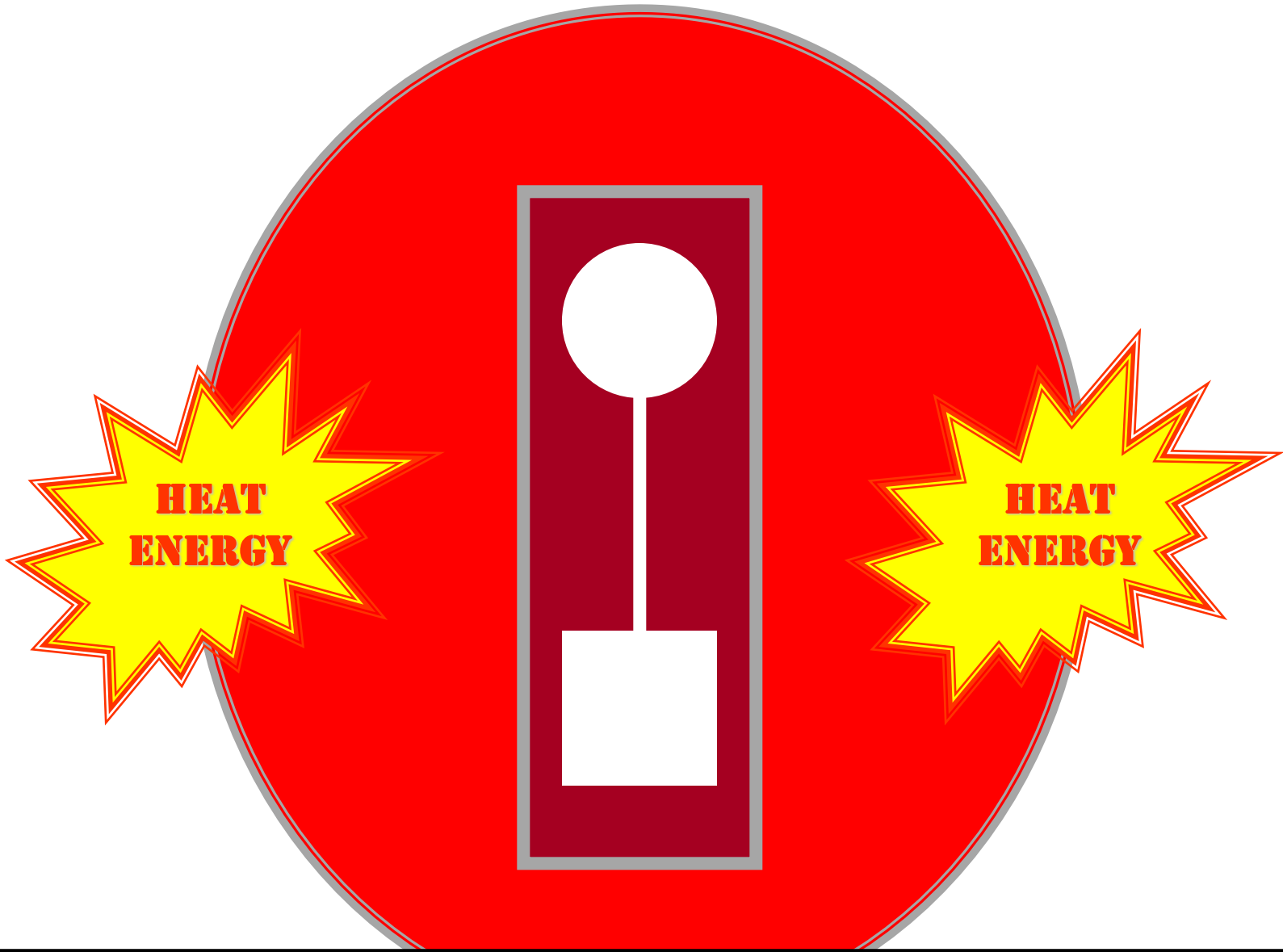
**HEAT  
ENERGY**

**HEAT  
ENERGY**

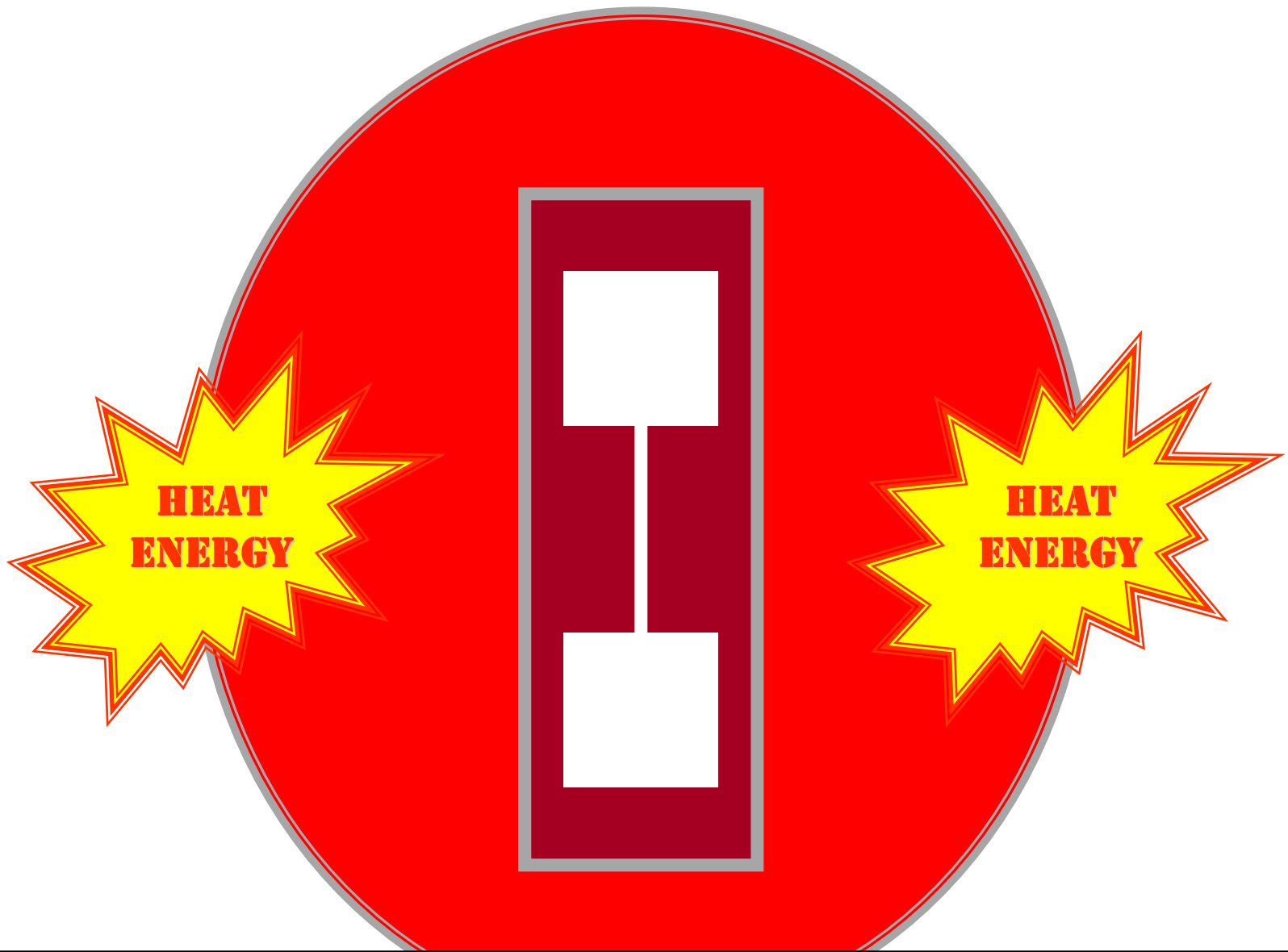
**ENZYME**



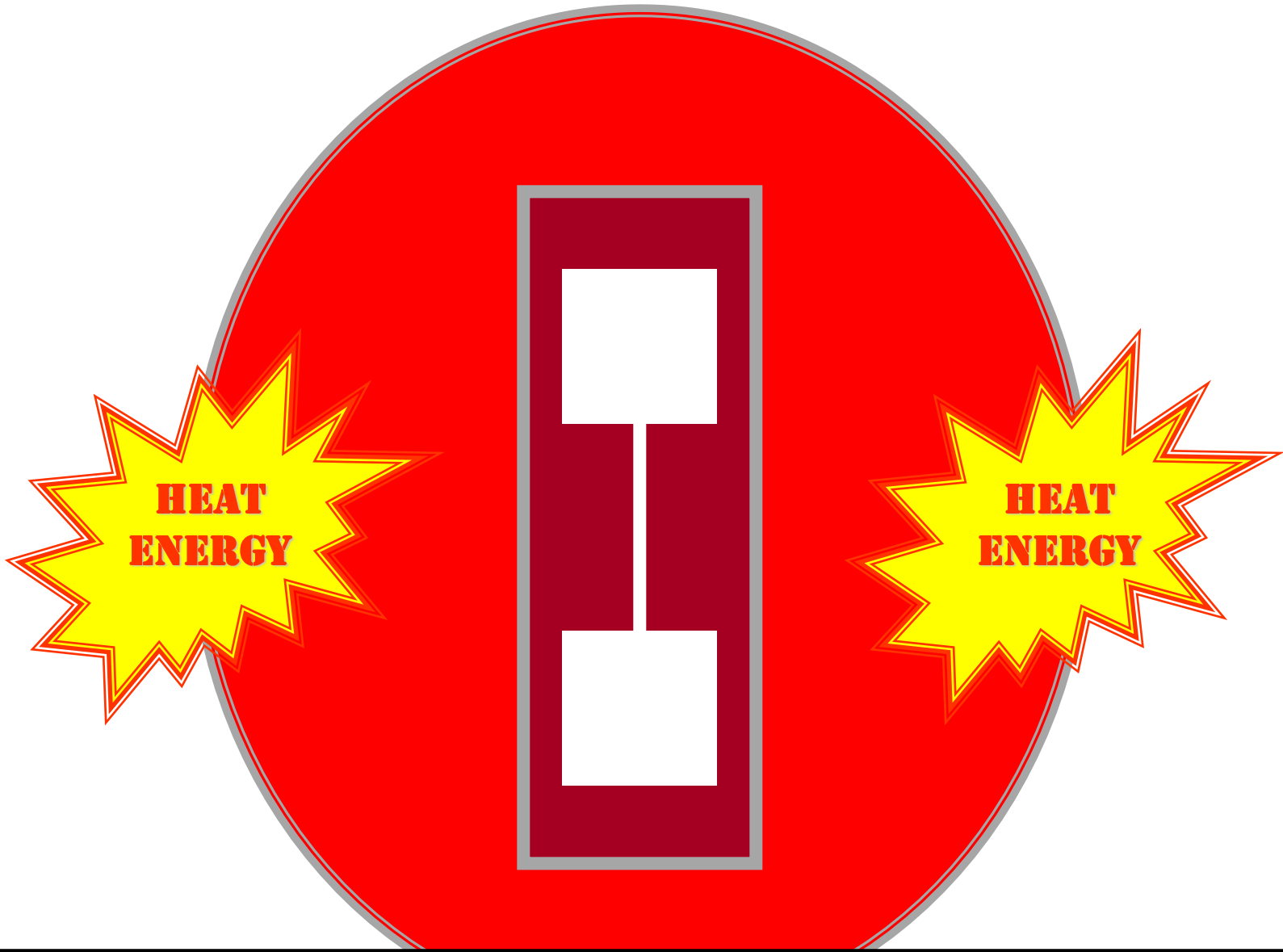
**ENZYME DENATURES**



**ACTIVE SITE**

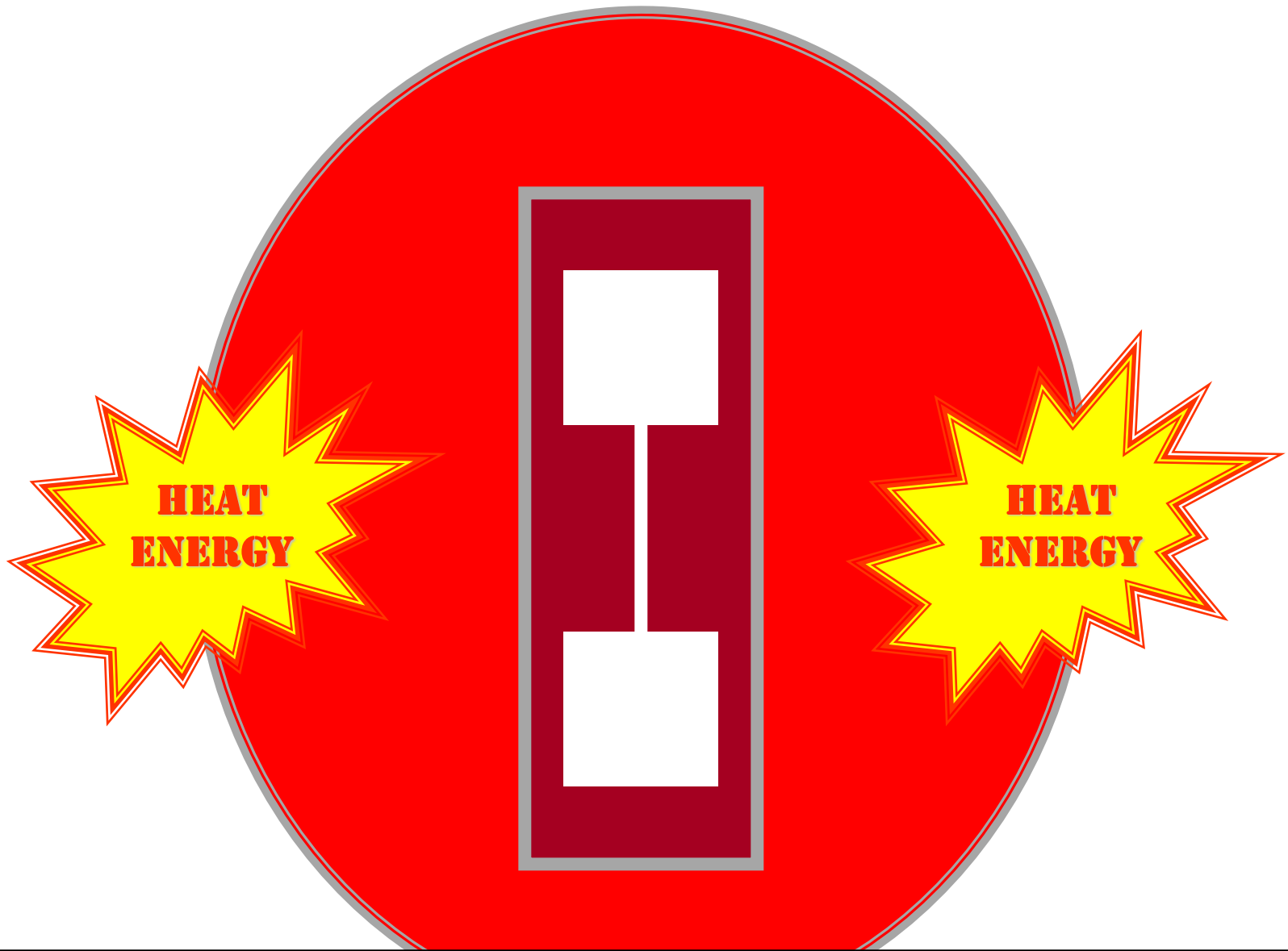


**A.S. CHANGES CONFORMATION**

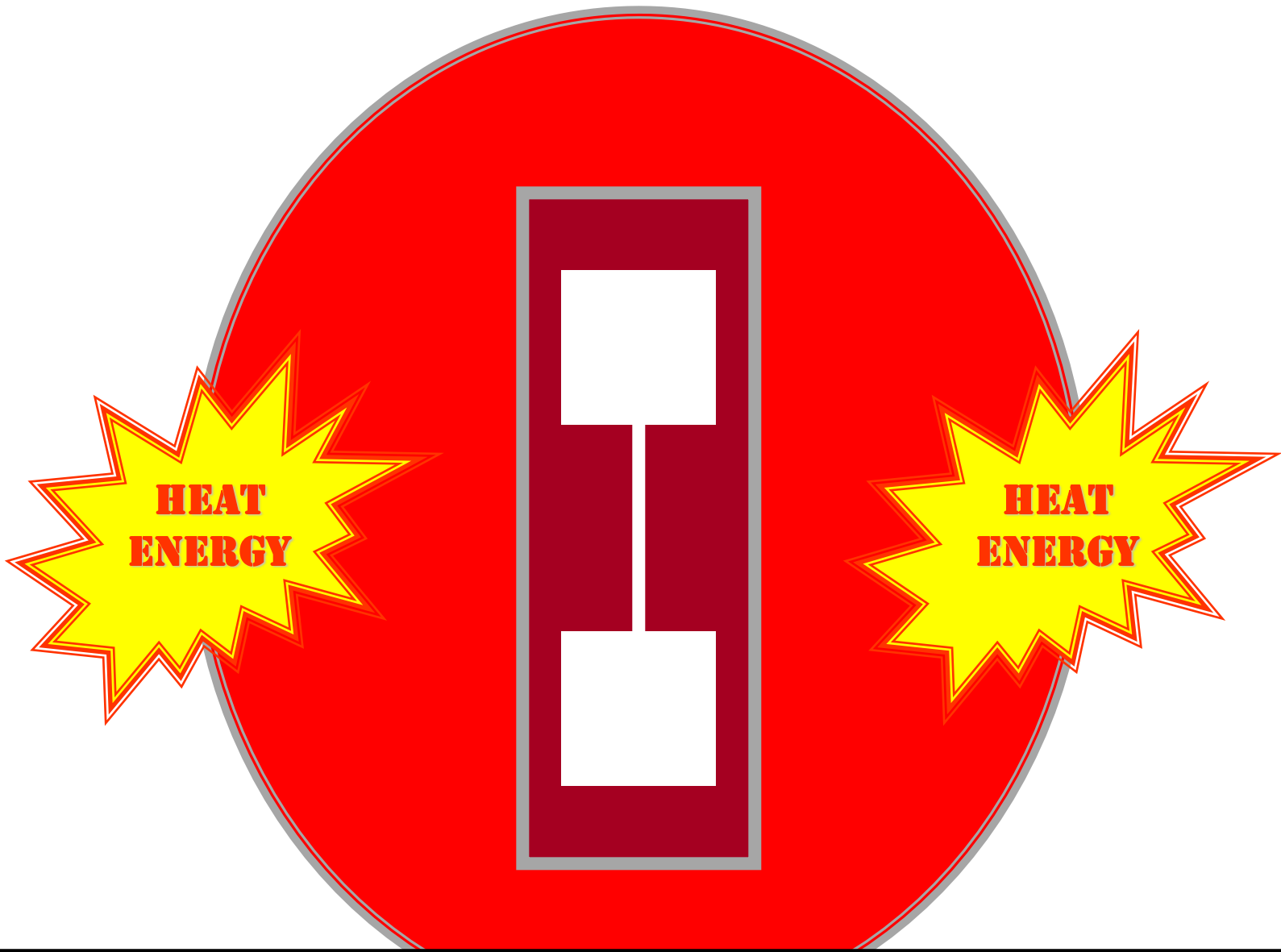


**ACTIVE SITE**





**ACTIVE SITE DENATURES**



**LOST ENZYME FUNCTION**

**METABOLISM**

**GLUCOSE**

**METABOLISM**

**HEXOKINASE**

**ATP**

**EGY**

**ADP**

**DN**

**GLUCOSE-6-PHOSPHATE**

**ENZYMES**  
VITAL TO METABOLISM

**PHOSPHOGLUCOISOMERASE**

**ENZYMES**  
VITAL TO METABOLISM

**FRUCTOSE-6-PHOSPHATE**

**PHOSPHOFRUCTOKINASE**

**ATP**

**EGY**

**ADP**

**FRUCTOSE-1-6-PHOSPHATE**

**RED = ENZYME**

**METABOLISM**

**GLUCOSE**

**METABOLISM**

HEX  ASE

**ATP**

**ADP**

**ADP**

**M**



**GLUCOSE-6-PHOSPHATE**

**ENZYMES  
DENATURE**

PHOSPHOG  SOMERASE

**ENZYMES  
DENATURE**

**FRUCTOSE-6-PHOSPHATE**

PHOSPHO  OKINASE

**ATP**

**ADP**

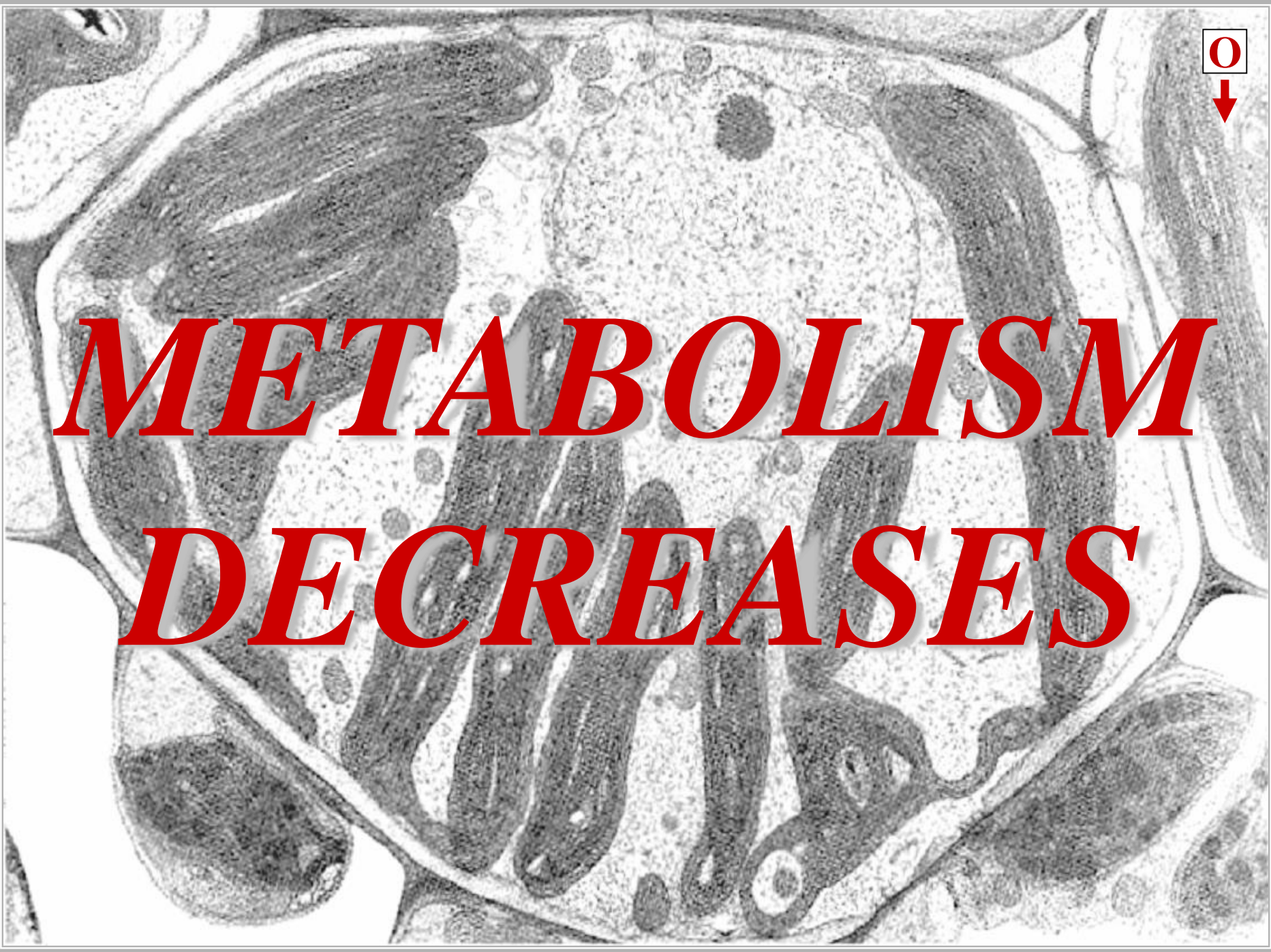
**ADP**

**FRUCTOSE-1-6-PHOSPHATE**

**RED = ENZYME**



***METABOLISM  
DECREASES***



E



*ORANIZATION  
DECREASES*



An electron micrograph showing a cross-section of a cell. The cell contains various organelles, including a large nucleus with a prominent nucleolus, several mitochondria with visible cristae, and a network of endoplasmic reticulum. The text "ENTROPY INCREASES" is overlaid in a large, bold, red, italicized font across the center of the image.

***ENTROPY  
INCREASES***

***HOMEOSTASIS  
DISRUPTED***





*CELL  
DEATH  
ORGANISM  
DEATH*

H  
Y  
P  
E  
R  
T  
H  
E  
R  
M  
I  
A

It's hot.  
It's humid.  
You're working hard.  
Do you know the  
signs of  
**heat  
ILLNESS?**

Beat the heat



H  
Y  
P  
E  
R  
T  
H  
E  
R  
M  
I  
A

#### HEAT EXHAUSTION

##### Symptoms

- Headaches
- Dizziness or lightheadedness
- Weakness
- Mood changes, irritability, confusion or the inability to think clearly
- Nausea and vomiting
- Decreased or dark-colored urine
- Fainting
- Pale, clammy skin

**ACT IMMEDIATELY.** If not treated, heat exhaustion can advance to heat stroke or death.

##### Take action!

- Move victim to cool, shaded area. Don't leave the person alone. If symptoms include dizziness or lightheadedness, lay the victim on his or her back and raise legs 6 to 8 inches. If symptoms include nausea or vomiting, lay the victim on his or her side.
- Loosen and remove any heavy clothing.
- Give the person cool water to drink – about a cup every 15 minutes – unless he or she is nauseous or vomiting.
- Fan the victim and spray with a cool mist of water or apply a wet cloth to skin.
- Call 911 for emergency help if the person does not feel better in a few minutes.

#### HEAT STROKE — A MEDICAL EMERGENCY

##### Symptoms

- Dry, pale skin with no sweating
- Hot, red skin that looks sunburned
- Mood changes, irritability, confusion or the inability to think clearly
- Seizures
- Inability to revive from an unconscious state

**CALL 911 for emergency help IMMEDIATELY.**

##### Take action!

- Move the victim to a cool, shaded area. Don't leave the person alone. Lay the victim on his or her back. Move any nearby objects away if the victim is having seizures. If symptoms include nausea or vomiting, lay the victim on his or her side.
- Loosen and remove any heavy clothing.
- Give the person cool water to drink – about a cup every 15 minutes – unless the victim is nauseous or vomiting.
- Fan the victim and spray with a cool mist of water or wipe the victim with a wet cloth, or cover with a wet sheet.
- Place ice packs under the armpits and groin area.

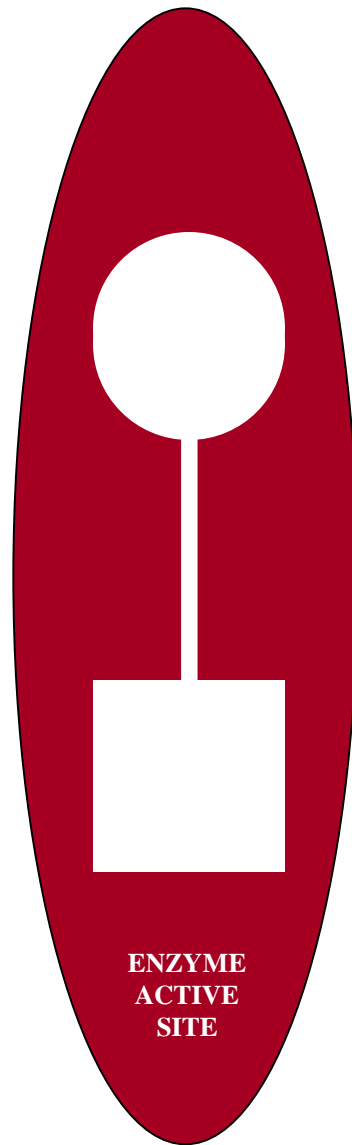
**Prevent heat illness**



**DRINK PLENTY OF FLUIDS**

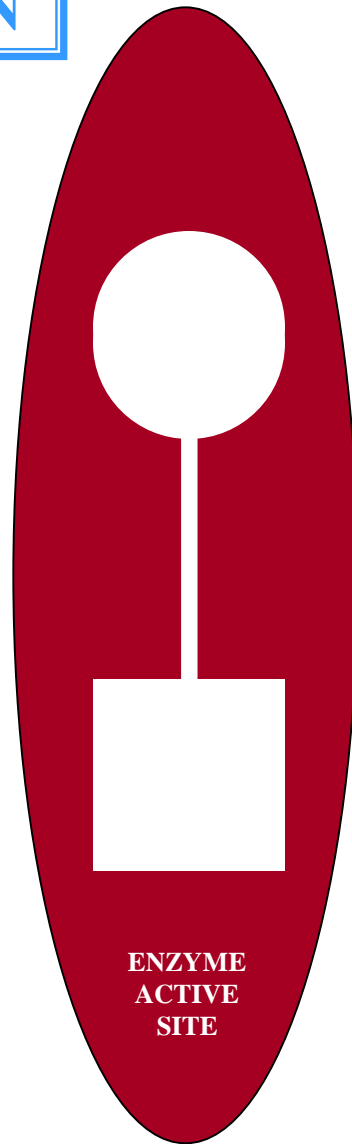


**ENZYME  
DENATURES  
pH CHANGE**

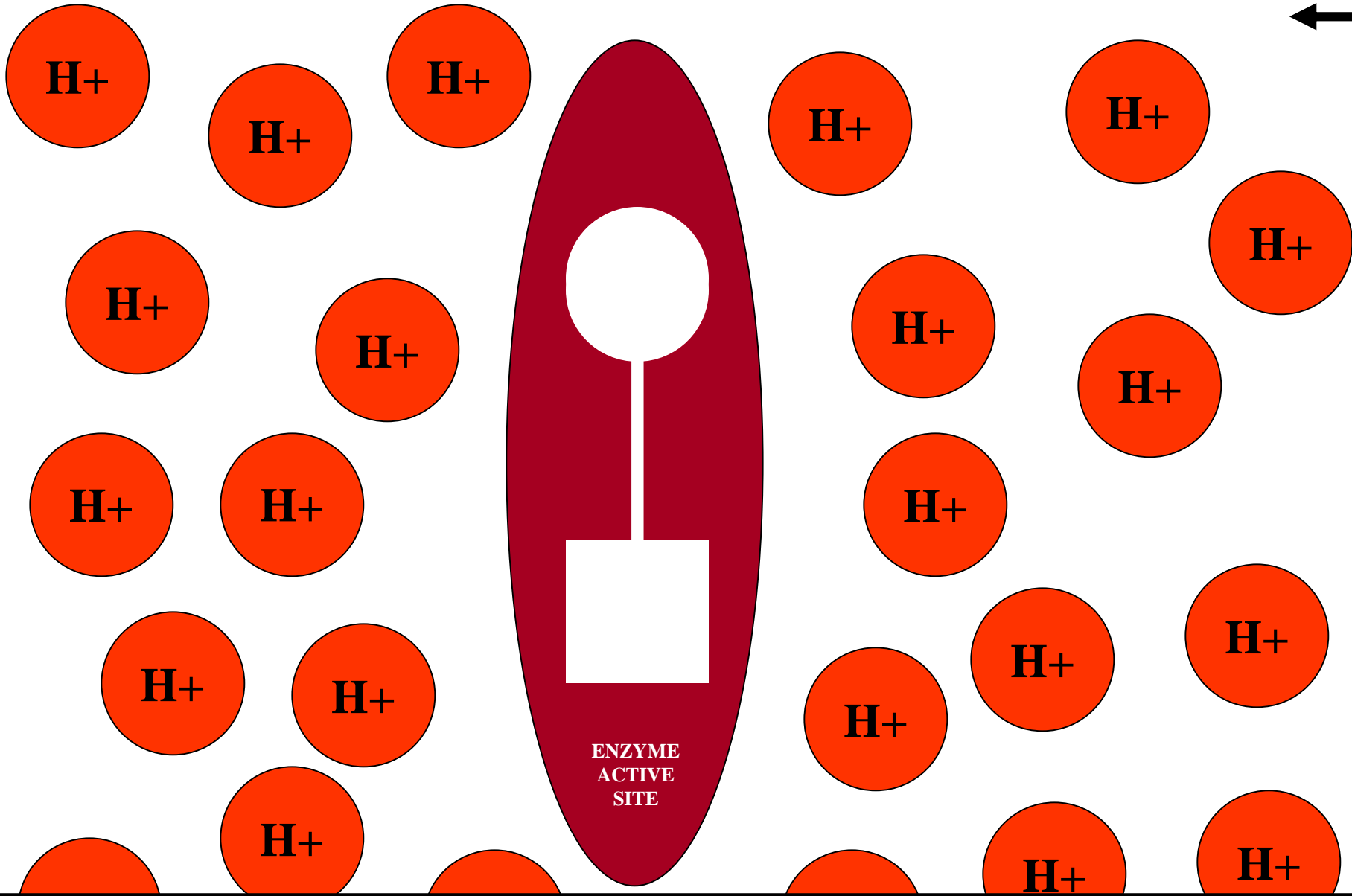


**ENZYME**

AQUEOUS SOLUTION

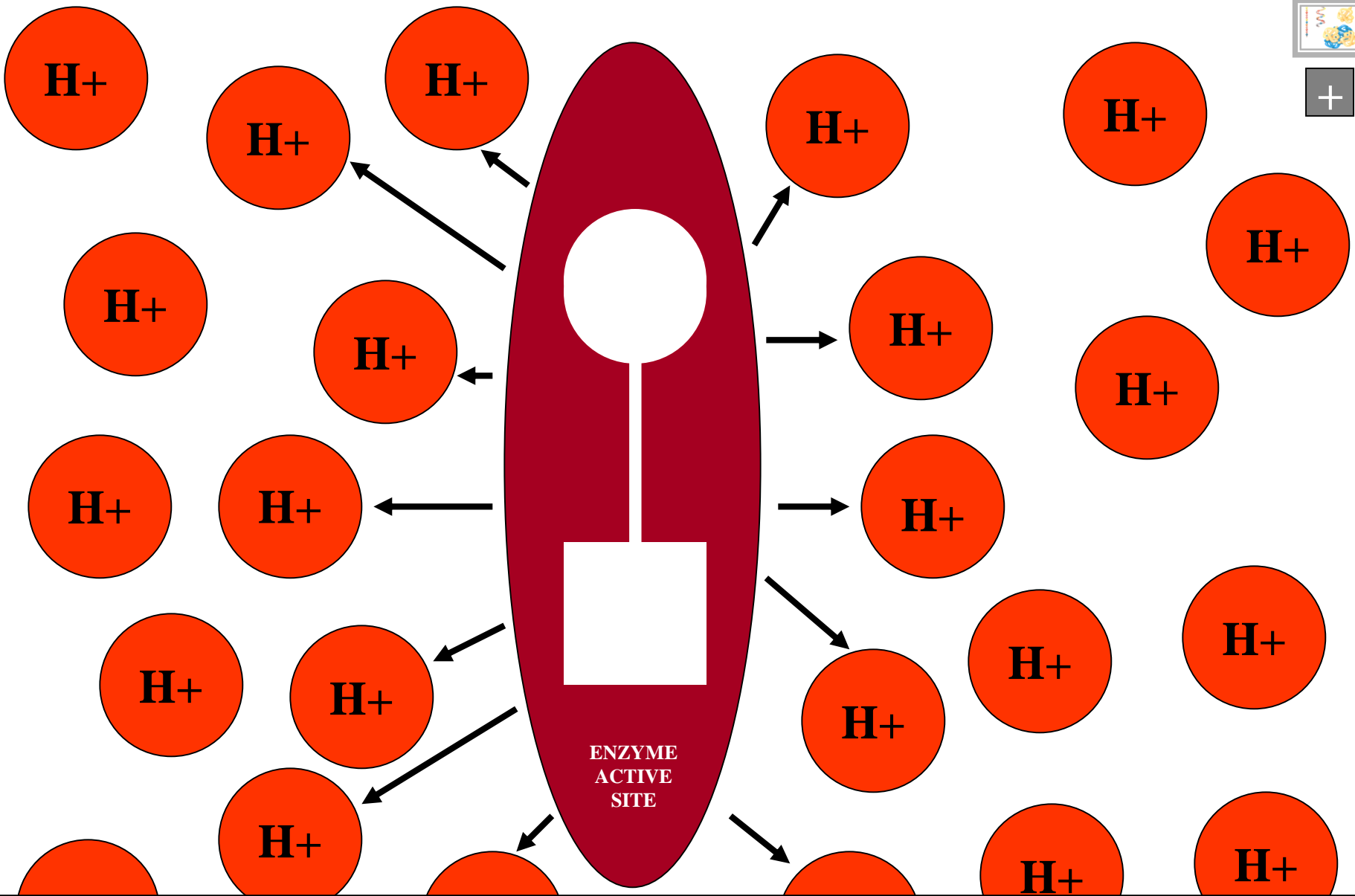


pH DECREASE



ENZYME  
ACTIVE  
SITE

**INCREASE H<sup>+</sup> IONS**

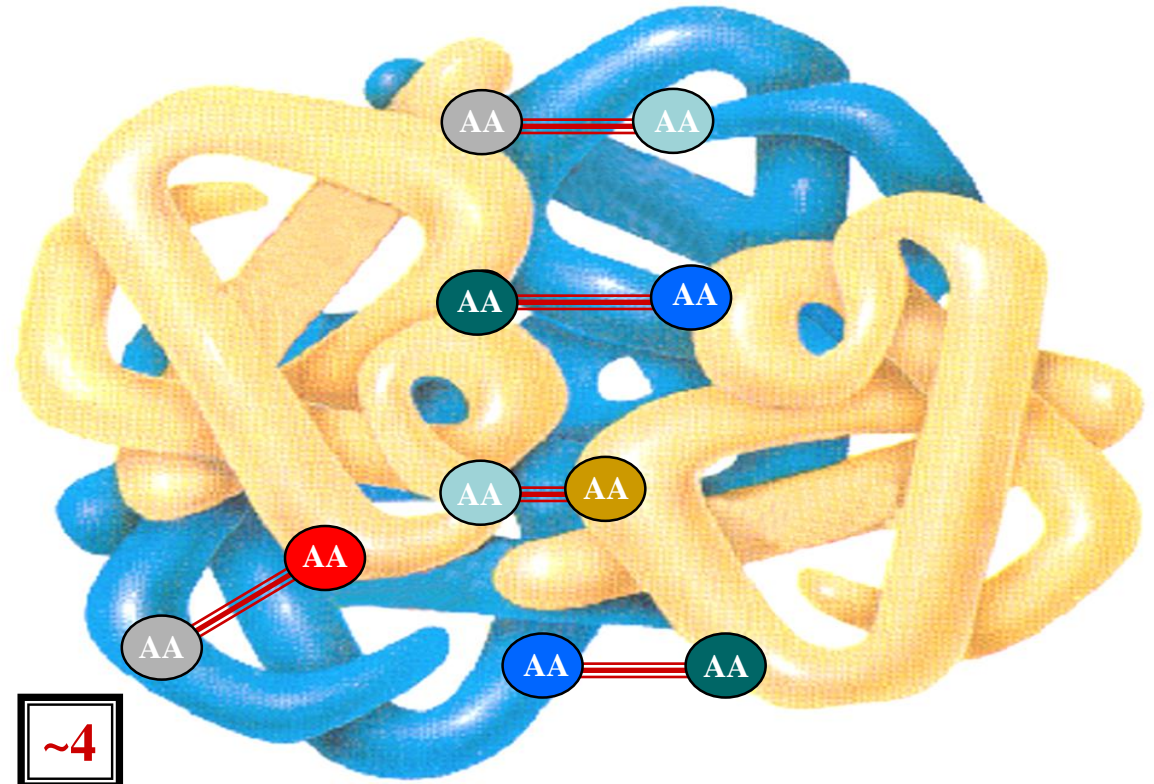


**INCREASE H<sup>+</sup> ATTRACTION/PULL**

**pH DECREASE  
INCREASES H<sup>+</sup> CONCENTRATION  
INCREASE H<sup>+</sup> ATTRACTION**

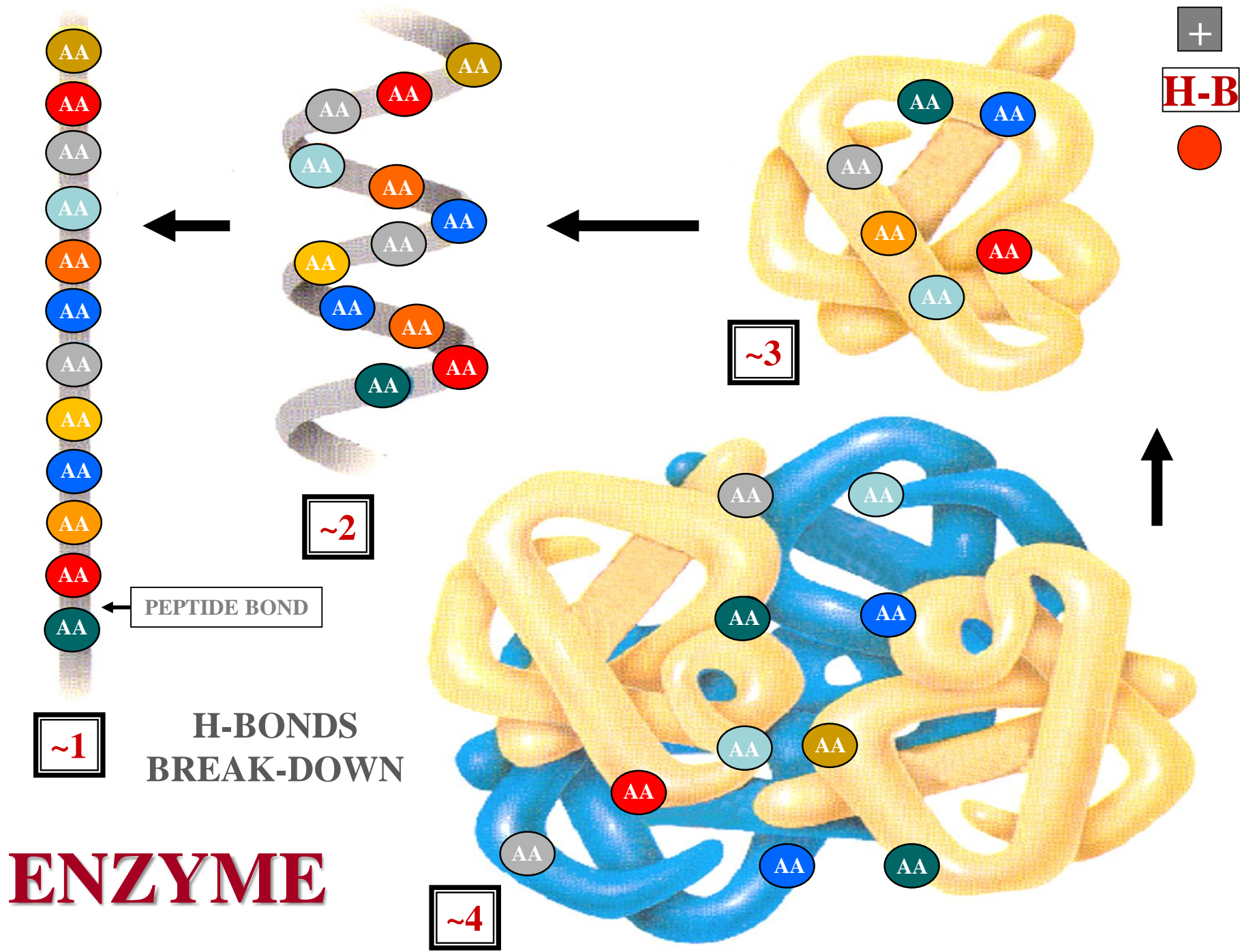
**ENZYME**

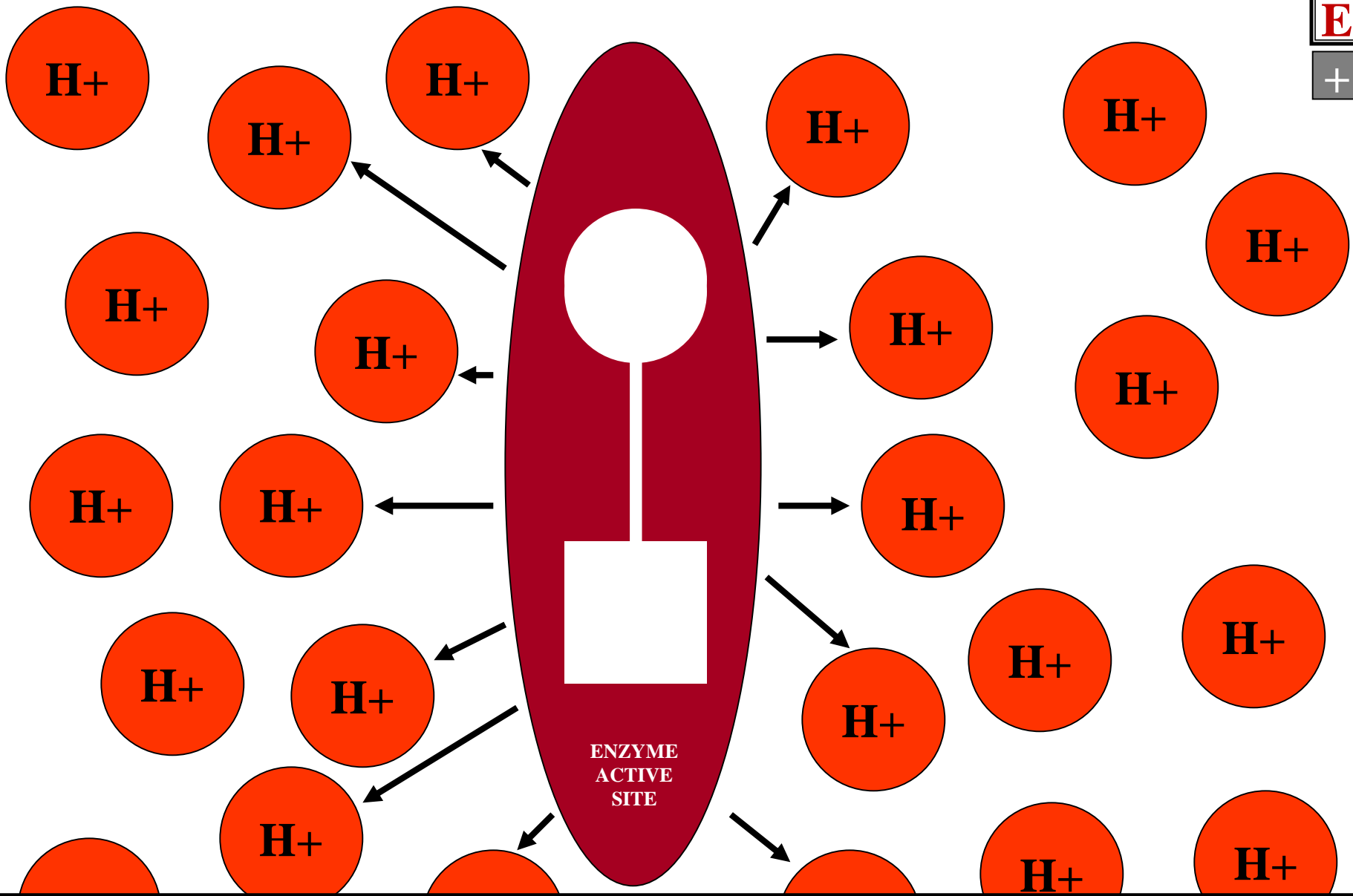
**H-BONDS  
WEAK BONDS**



==== = H-BOND

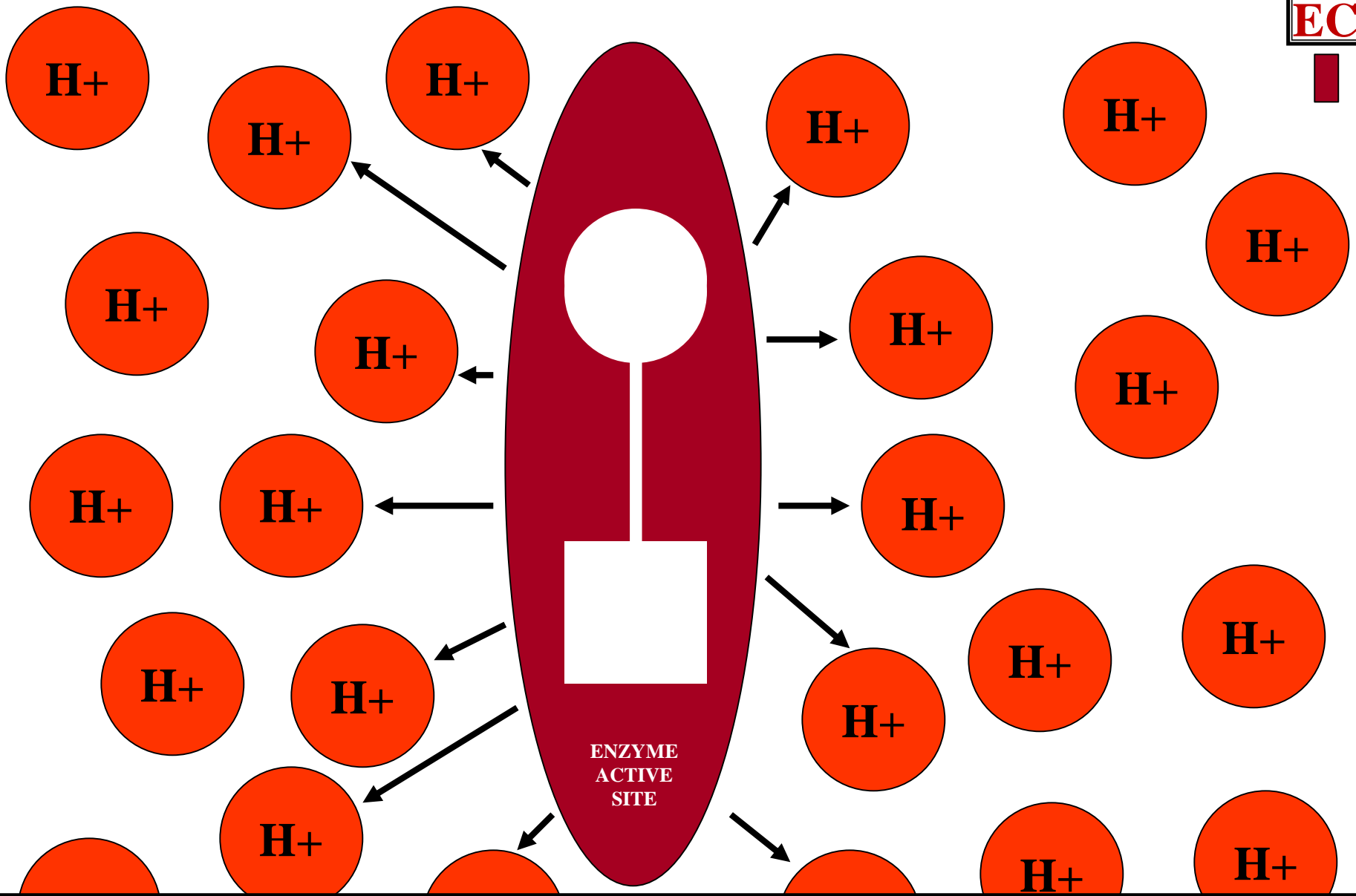




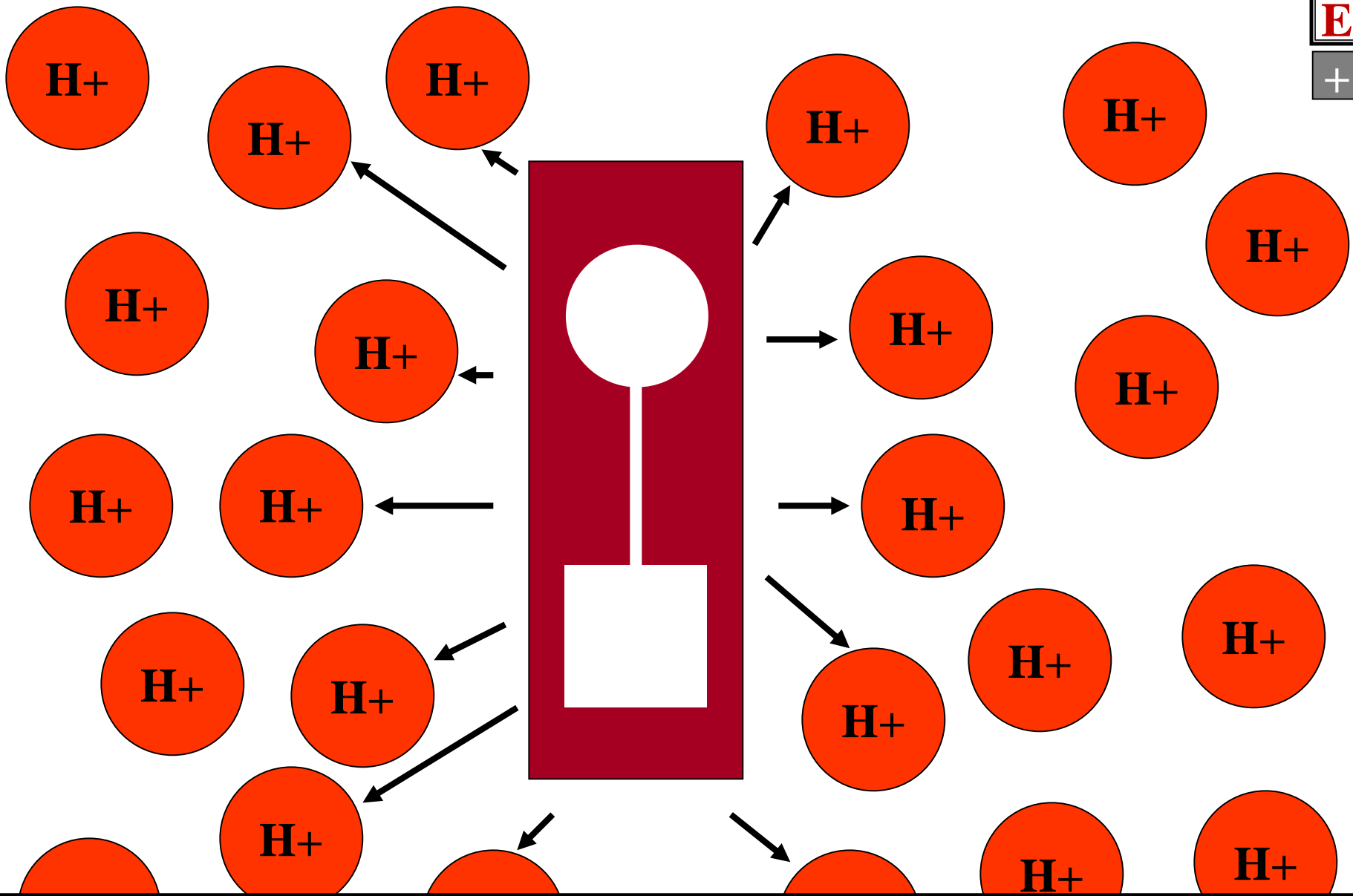


**H-BONDS BREAK-DOWN**

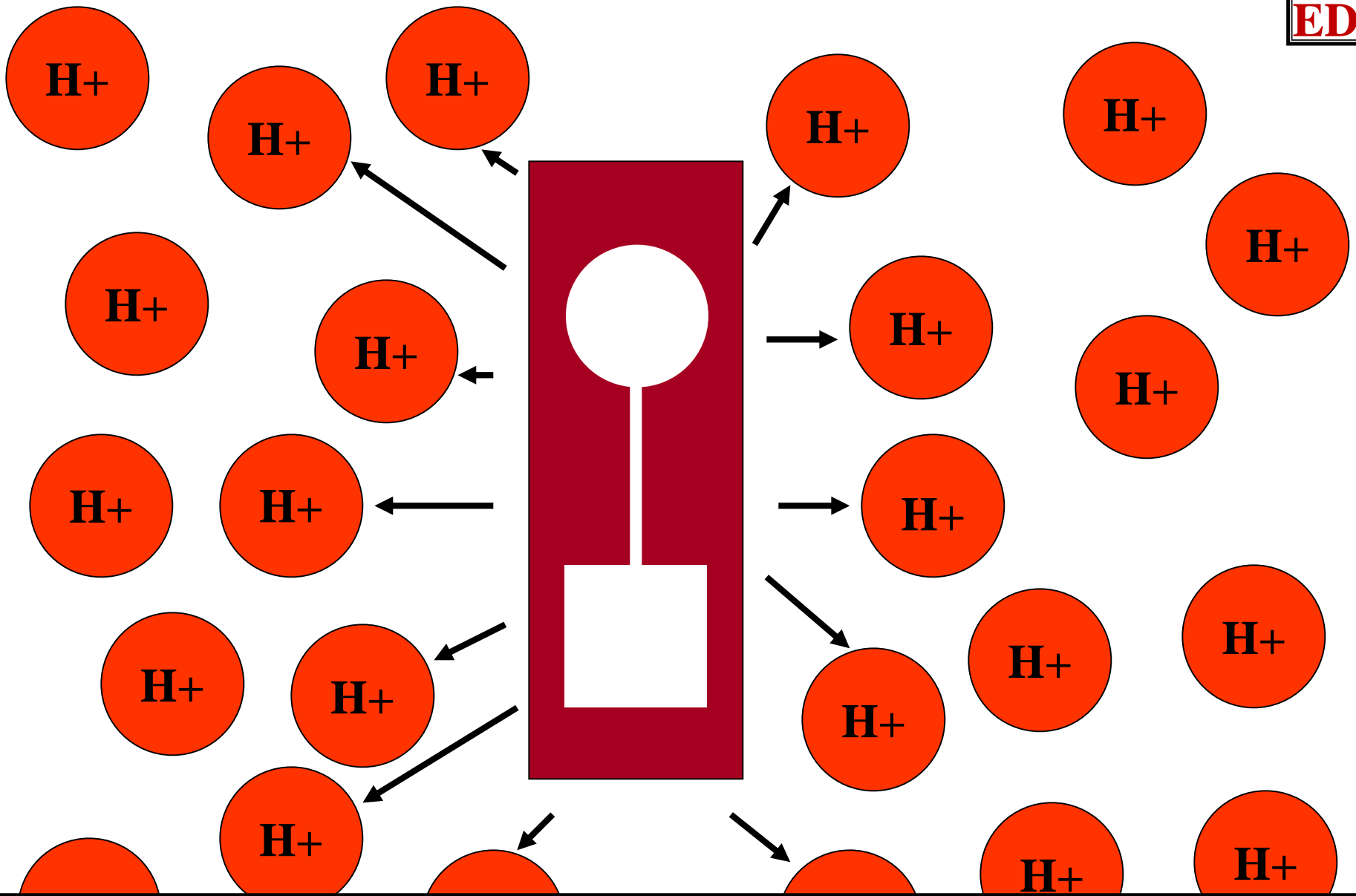
EC



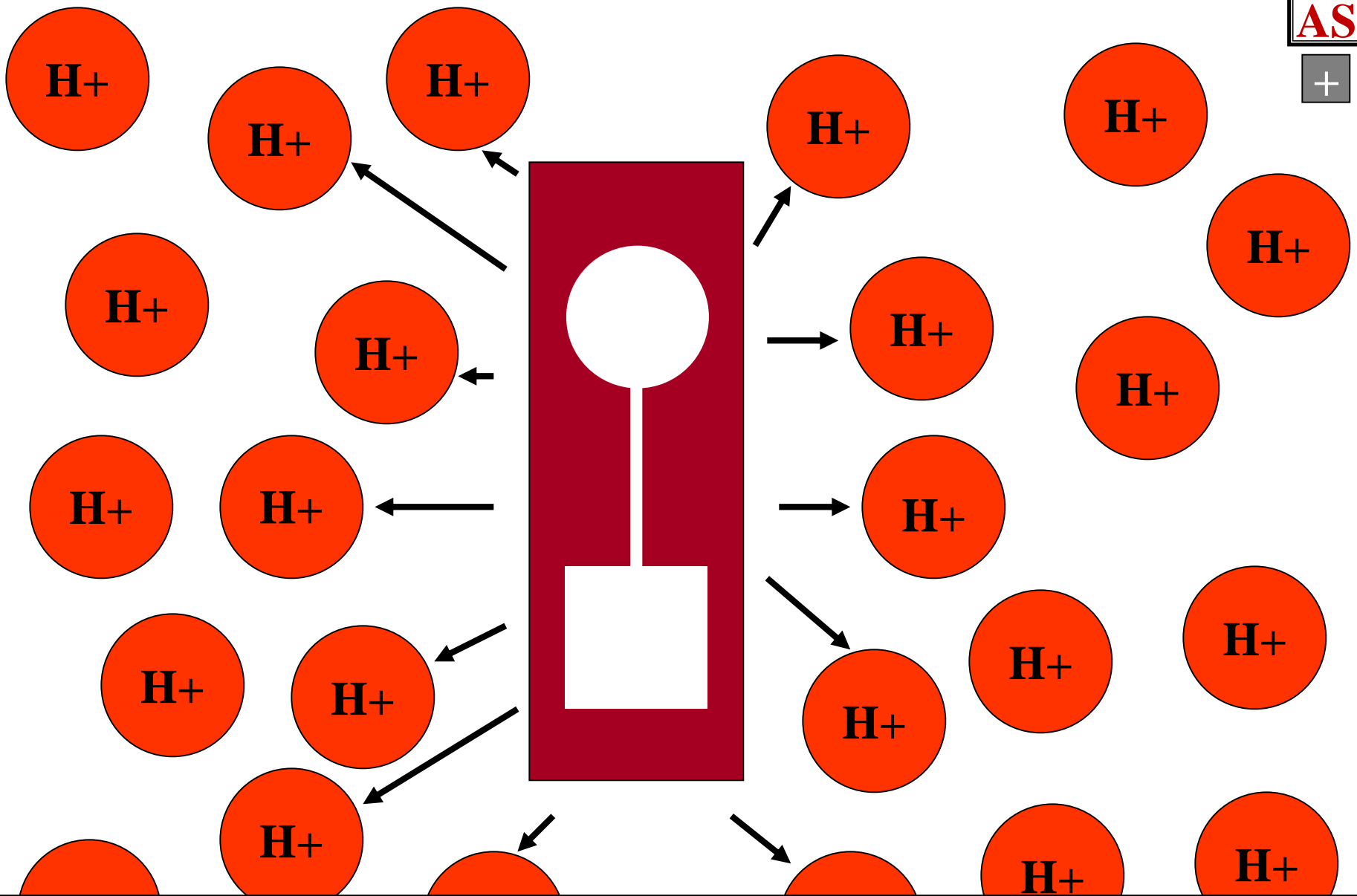
**ENZYME**



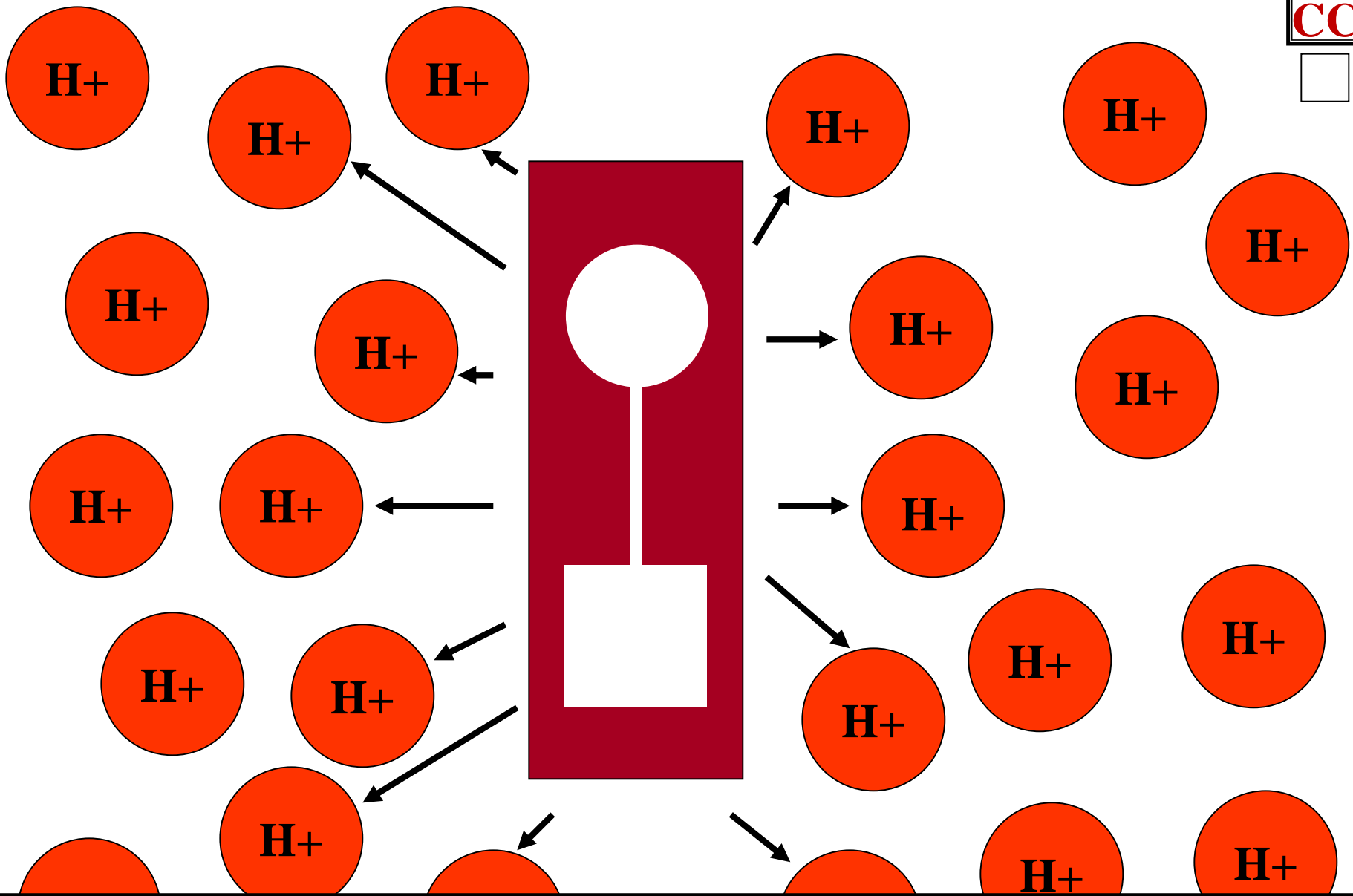
**ENZYME CHANGES CONFORMATION**



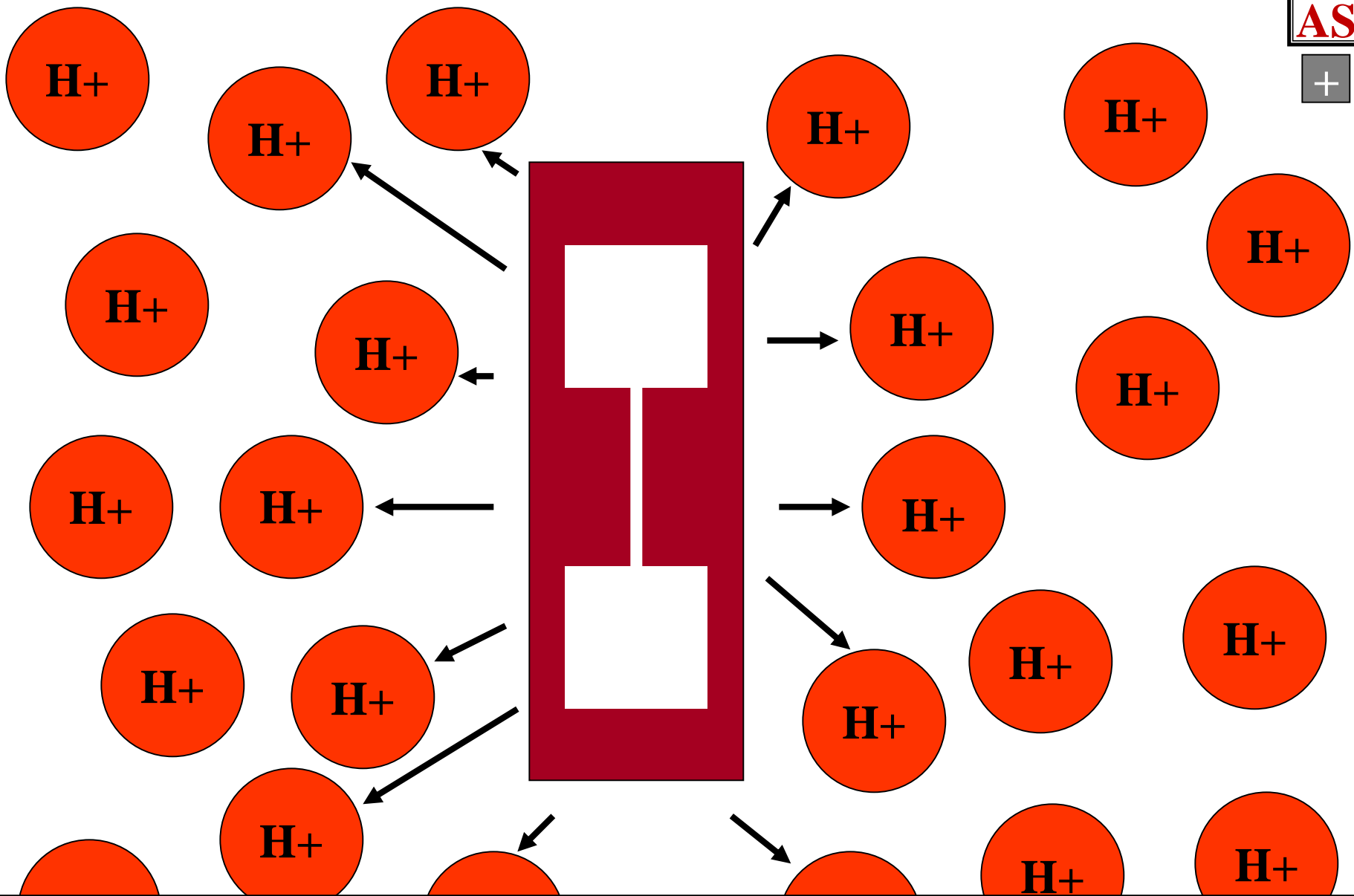
**ENZYME**



**ENZYME DENATURES**

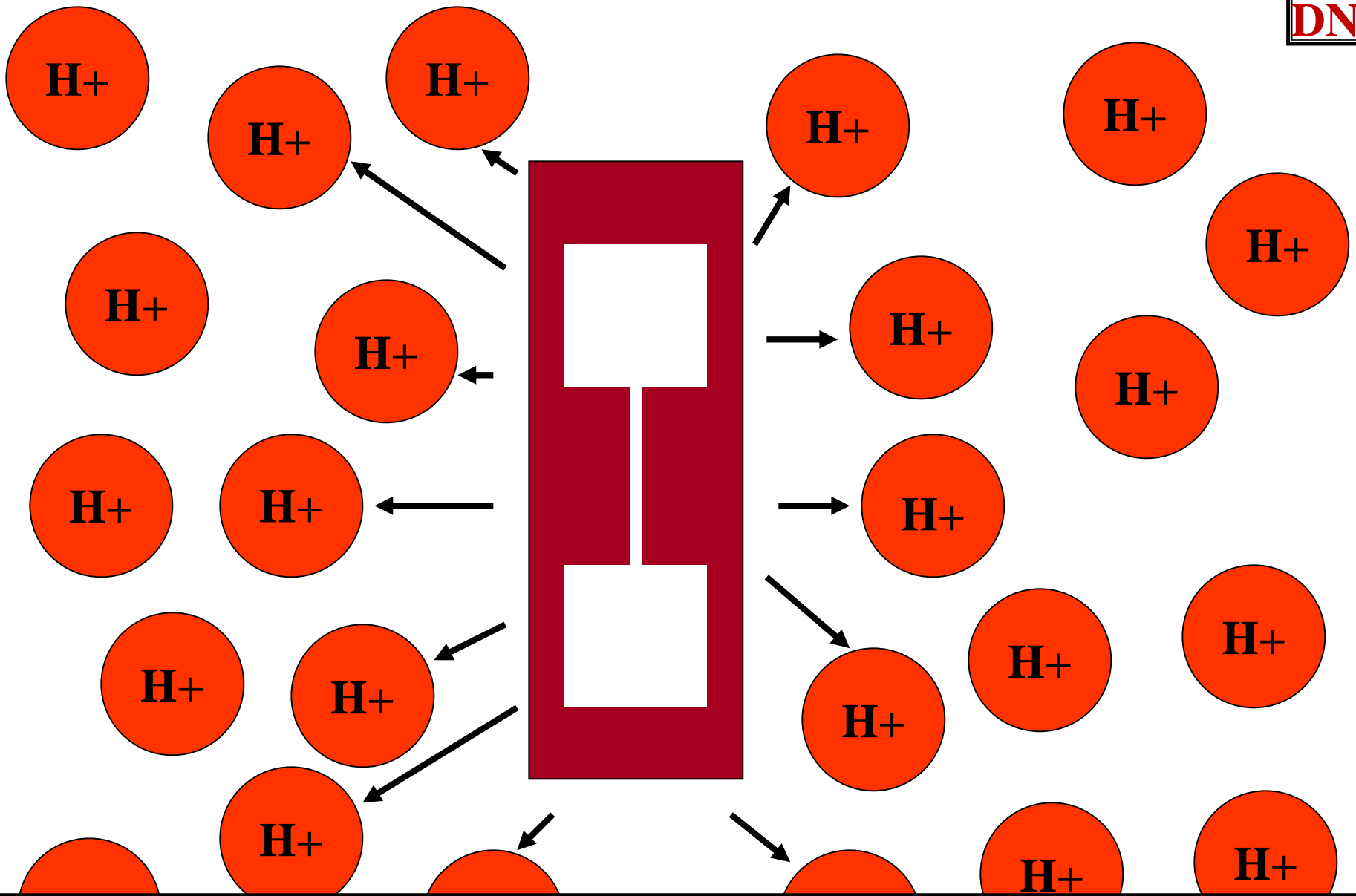


**ACTIVE SITE**

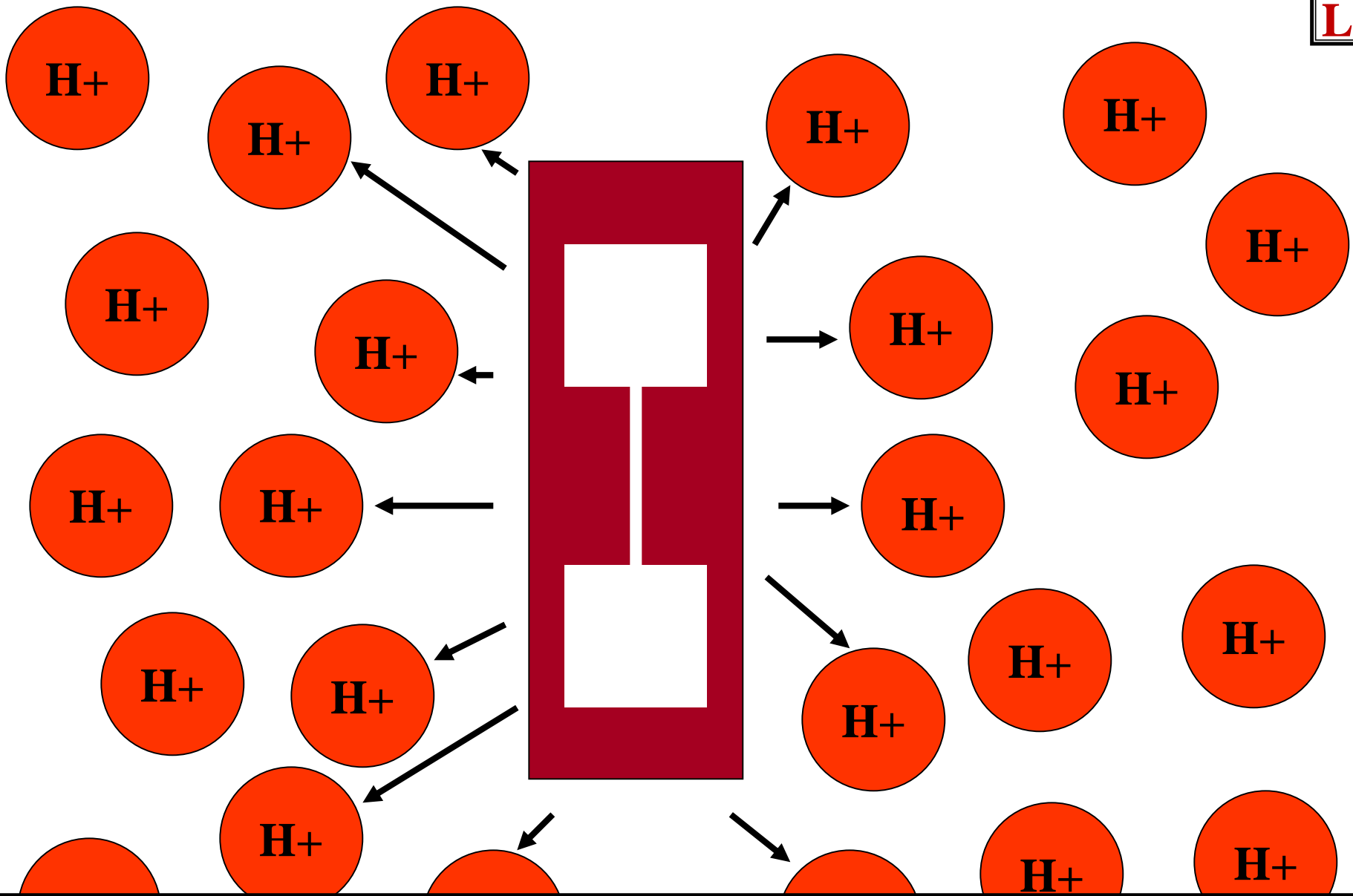


**A.S. CHANGES CONFORMATION**

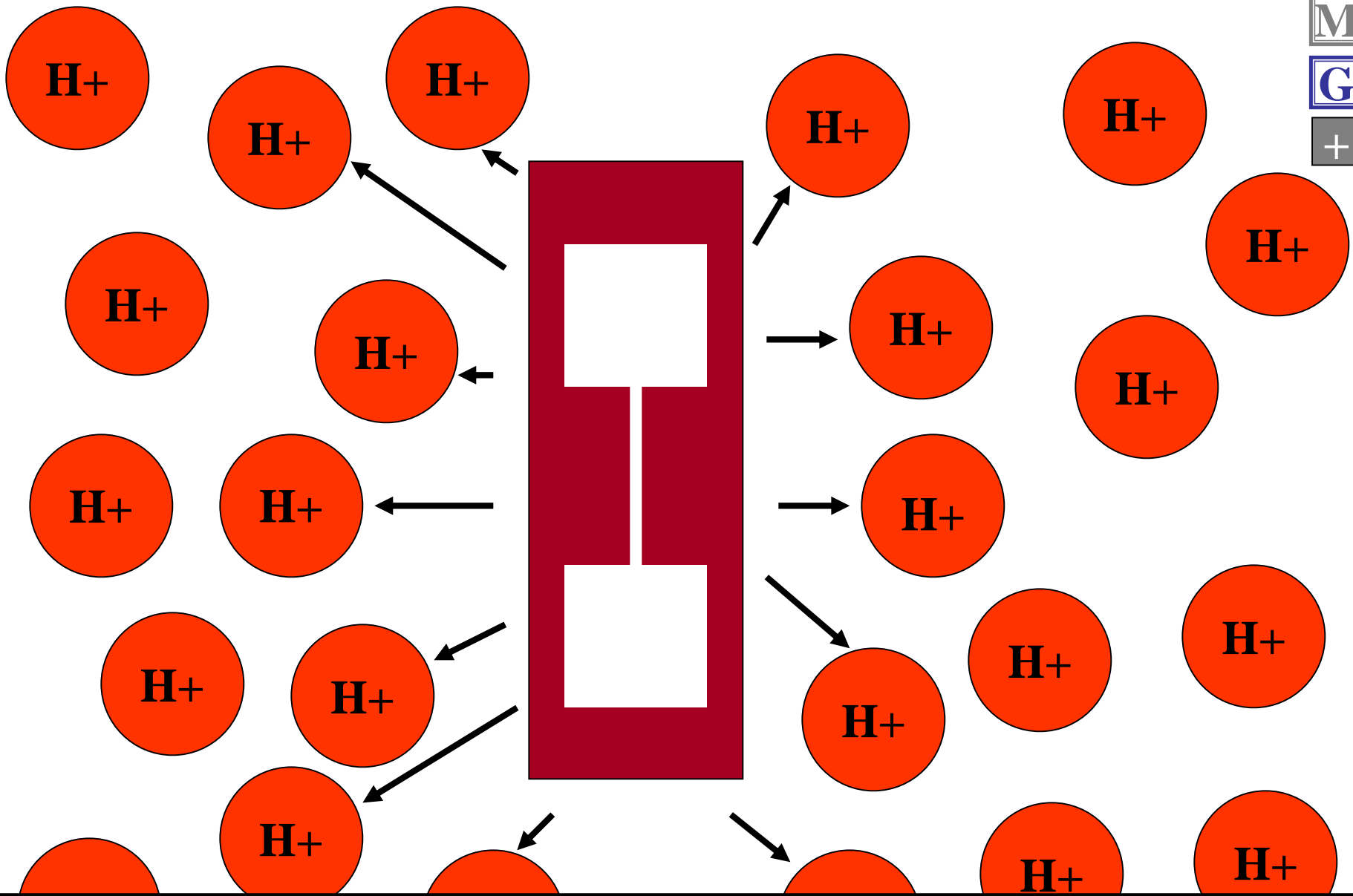




**ACTIVE SITE**



**ACTIVE SITE DENATURES**



**LOST ENZYME FUNCTION**

**METABOLISM**

**GLUCOSE**

**METABOLISM**

**HEXOKINASE**

**ATP**

**EGY**

**ADP**



**DN**

**GLUCOSE-6-PHOSPHATE**

**PHOSPHOGLUCOISOMERASE**

**ENZYMES**  
VITAL TO METABOLISM

**ENZYMES**  
VITAL TO METABOLISM

**FRUCTOSE-6-PHOSPHATE**

**PHOSPHOFRUCTOKINASE**

**ATP**

**EGY**

**ADP**

**FRUCTOSE-1-6-PHOSPHATE**

**RED = ENZYME**

**METABOLISM**

**GLUCOSE**

**METABOLISM**

HEX  ASE

**ATP**

**EGY**

**ADP**

**M**



**GLUCOSE-6-PHOSPHATE**

**ENZYMES  
DENATURE**

PHOSPHOG  SOMERASE

**ENZYMES  
DENATURE**

**FRUCTOSE-6-PHOSPHATE**

PHOSPHO  OKINASE

**ATP**

**EGY**

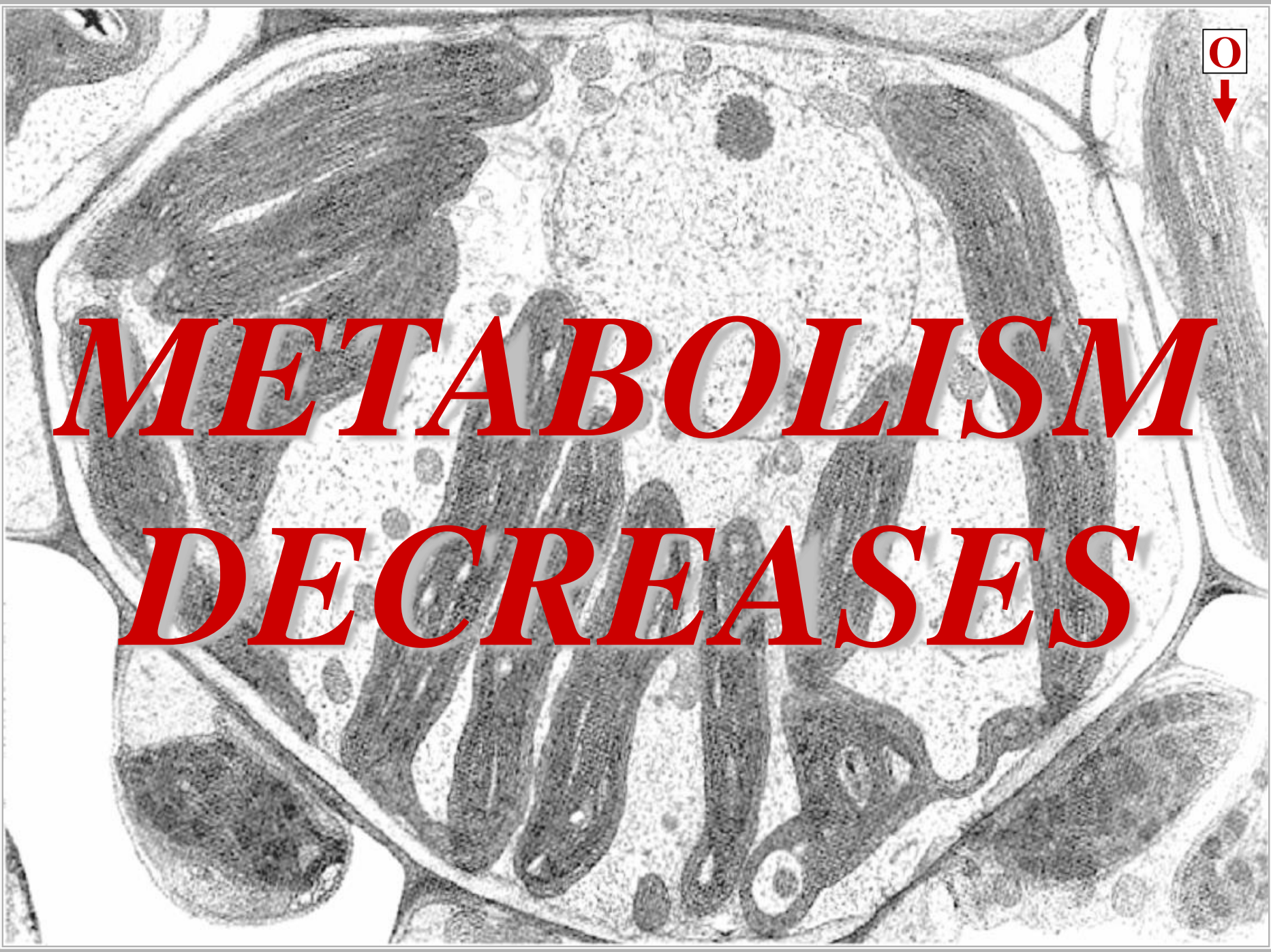
**ADP**

**FRUCTOSE-1-6-PHOSPHATE**

**RED = ENZYME**



***METABOLISM  
DECREASES***



E



***ORANIZATION  
DECREASES***



***ENTROPY  
INCREASES***



***HOMEOSTASIS  
DISRUPTED***



***CELL  
DEATH  
ORGANISM  
DEATH***



# *ACIDS PRECIPITATE*

**ACID RAIN**

# ACID RAIN



FISH KILL





***TEMP & pH***

***IMPACTS***

***ENZYME FUNCTION***

***---***

***IMPACTS***

***CELL METABOLISM***



**ENZYME  
INHIBITORS  
&  
ENZYME  
REGULATION**

# ENZYMES INHIBITORS

**ENZYMES  
INHIBITORS**



# ENZYME INHIBITOR



BLOCKS SUB/ENZ  
INTERACTION

ENZYME INHIBITOR

**ENZYME INHIBITOR**



**BLOCKS SUB/ENZ  
INTERACTION**

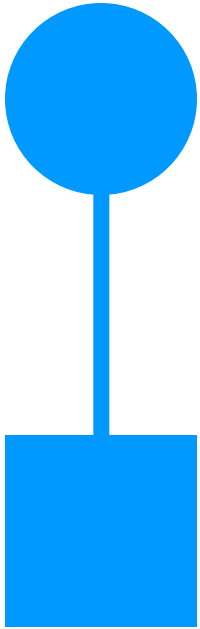
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**OUTCOME**

**NO PRODUCT OUTPUT**

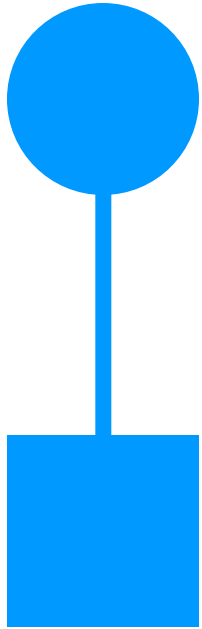
**ENZYME INHIBITOR**

# ENZYME INHIBITOR

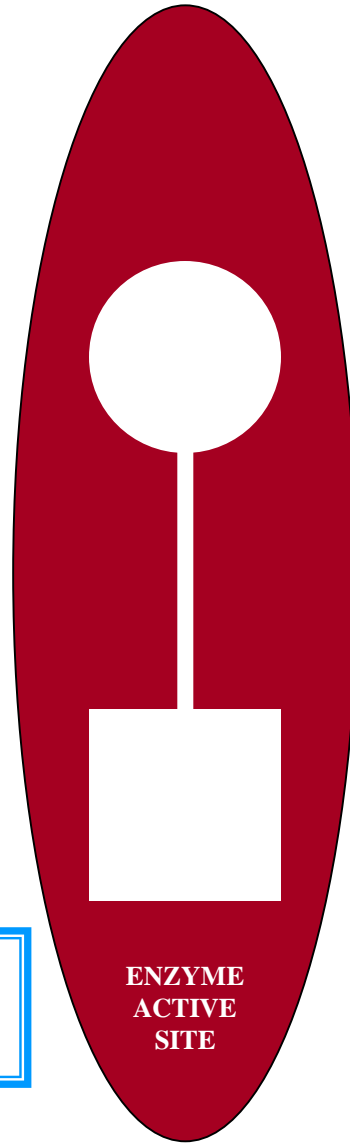


SUBSTRATE

# ENZYMES INHIBITORS



SUBSTRATE



ENZYMES  
ACTIVE  
SITE

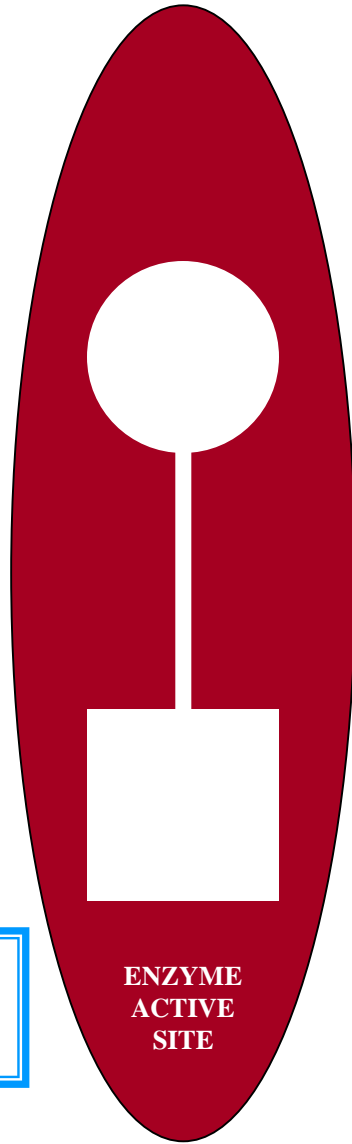
ENZYMES



**ENZYME  
INHIBITOR**



**SUBSTRATE**



ENZYME  
ACTIVE  
SITE

**ENZYME**

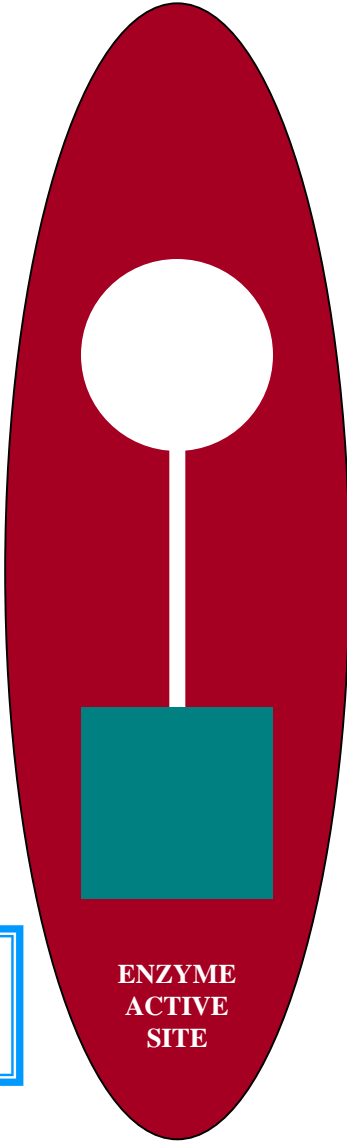
**ENZYME  
INHIBITOR**



**ENZYME  
INHIBITOR**



**SUBSTRATE**



ENZYME  
ACTIVE  
SITE

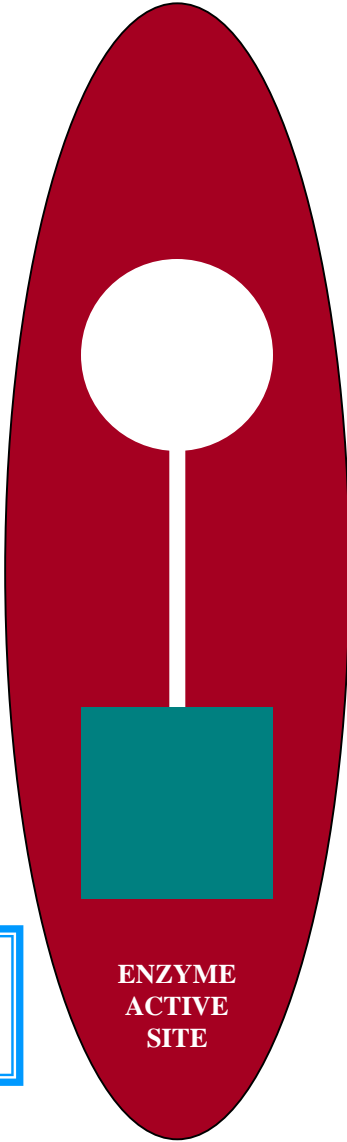
**ENZYME**

**ENZYME  
INHIBITOR  
OCCUPIES  
ACTIVE SITE**

**ENZYME  
INHIBITOR**



**SUBSTRATE**



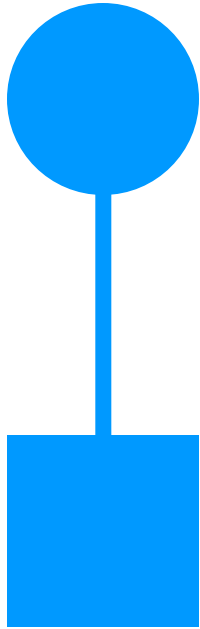
ENZYME  
ACTIVE  
SITE

**ENZYME**

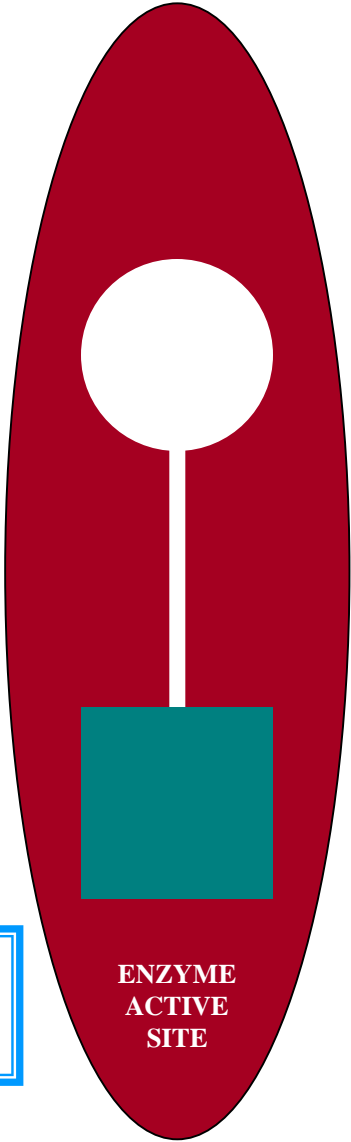
**ENZYME  
INHIBITOR  
BLOCKS  
SUB/ENZ  
INTERACTION**



**ENZYME  
INHIBITOR**



**SUBSTRATE**



ENZYME  
ACTIVE  
SITE

**ENZYME**

**NO  
PRODUCT  
OUTPUT**



# ENZYME INHIBITOR TYPES

# **ENZYME INHIBITOR TYPES**

**COMPETITIVE INHIBITOR**

**ENZYME INHIBITOR  
TYPES**

# ENZYLE INHIBITOR TYPES



COMPETITIVE INHIBITOR  
NON-COMPETITIVE INHIBITOR

ENZYLE INHIBITOR  
TYPES

# COMPETITIVE INHIBITOR

# **COMPETITIVE INHIBITOR**

# COMPETITIVE INHIBITOR

BINDS WITH ACTIVE SITE

COMPETITIVE INHIBITOR

# COMPETITIVE INHIBITOR

BINDS WITH ACTIVE SITE

---

OCCUPIES A.S.

# COMPETITIVE INHIBITOR

# COMPETITIVE INHIBITOR

BINDS WITH ACTIVE SITE

---

OCCUPIES A.S.

---

BLOCKS SUB/ENZ INTERACTION

# COMPETITIVE INHIBITOR



# COMPETITIVE INHIBITOR



BINDS WITH ACTIVE SITE

---

OCCUPIES A.S.

---

BLOCKS SUB/ENZ INTERACTION

---

OUTCOME

NO PRODUCT OUTPUT

# COMPETITIVE INHIBITOR

# COMPETITIVE INHIBITOR

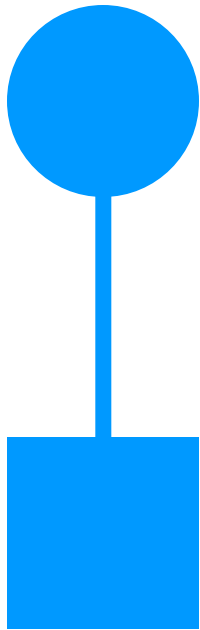


# COMPETITIVE INHIBITOR

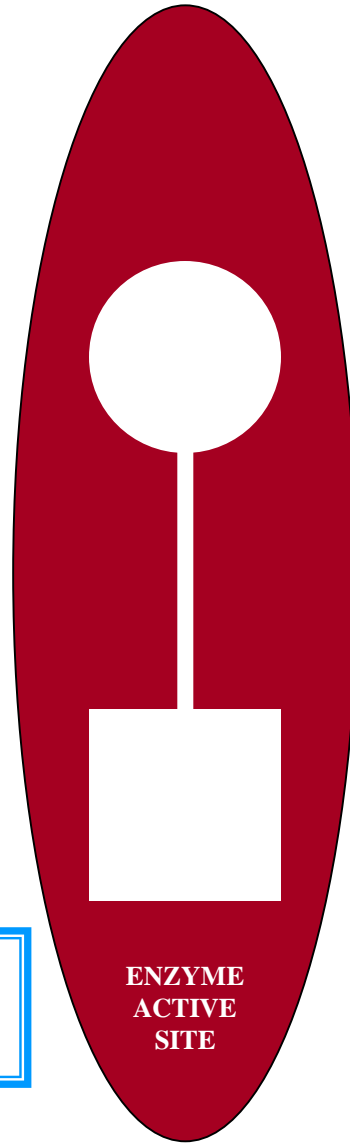


SUBSTRATE

# COMPETITIVE INHIBITOR



SUBSTRATE



ENZYME  
ACTIVE  
SITE

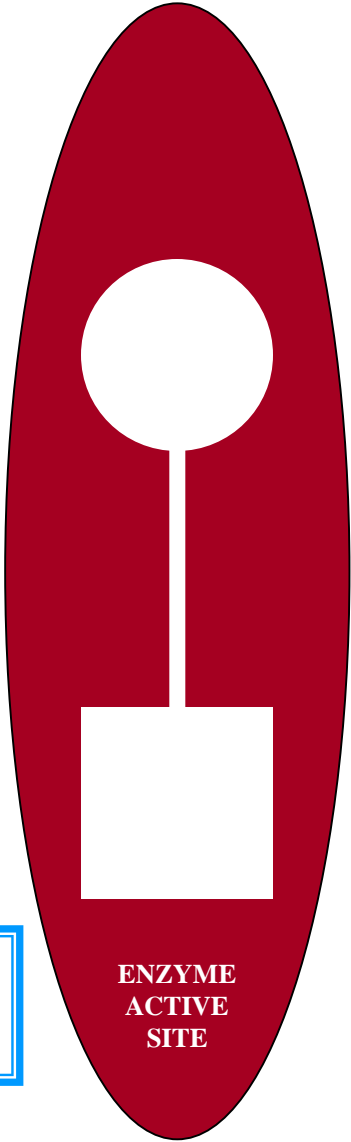
ENZYME



**COMPETITIVE  
INHIBITOR**

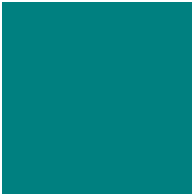


**SUBSTRATE**



**ENZYME**

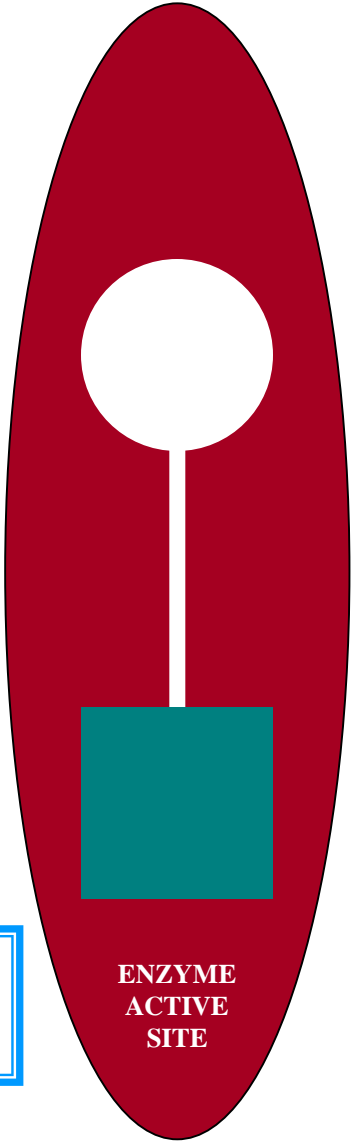
**ENZYME  
INHIBITOR**



**COMPETITIVE  
INHIBITOR**



**SUBSTRATE**

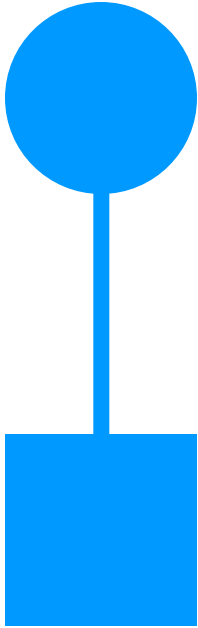


ENZYME  
ACTIVE  
SITE

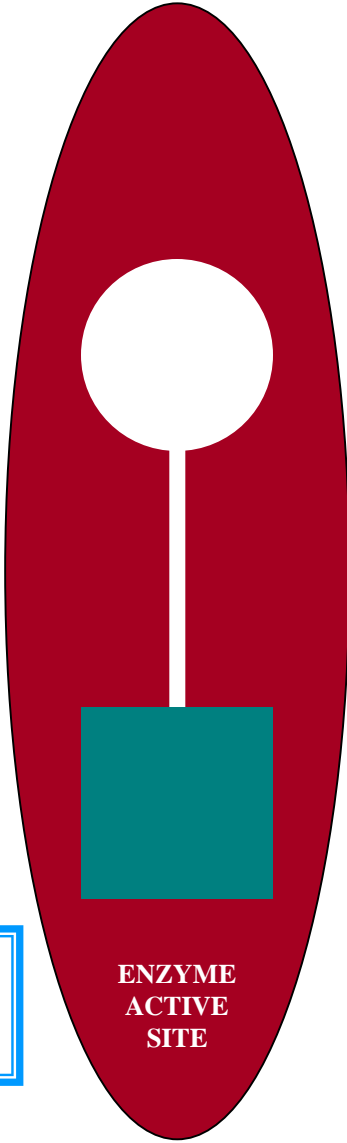
**ENZYME**

**ENZYME  
INHIBITOR  
BINDS WITH  
ACTIVE SITE**

**COMPETITIVE  
INHIBITOR**



**SUBSTRATE**



ENZYME  
ACTIVE  
SITE

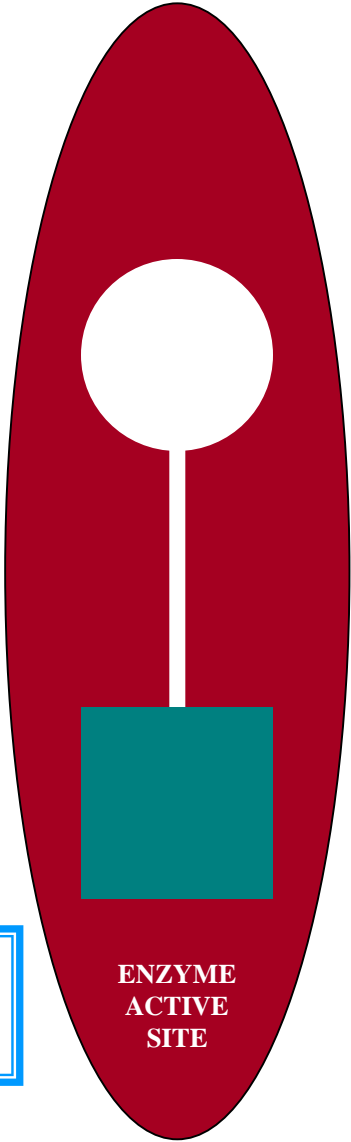
**ENZYME**

**ENZYME  
INHIBITOR  
OCCUPIES  
ACTIVE SITE**

**COMPETITIVE  
INHIBITOR**



**SUBSTRATE**



ENZYME  
ACTIVE  
SITE

**ENZYME**

**ENZYME  
INHIBITOR  
BLOCKS  
SUB/ENZ  
INTERACTION**

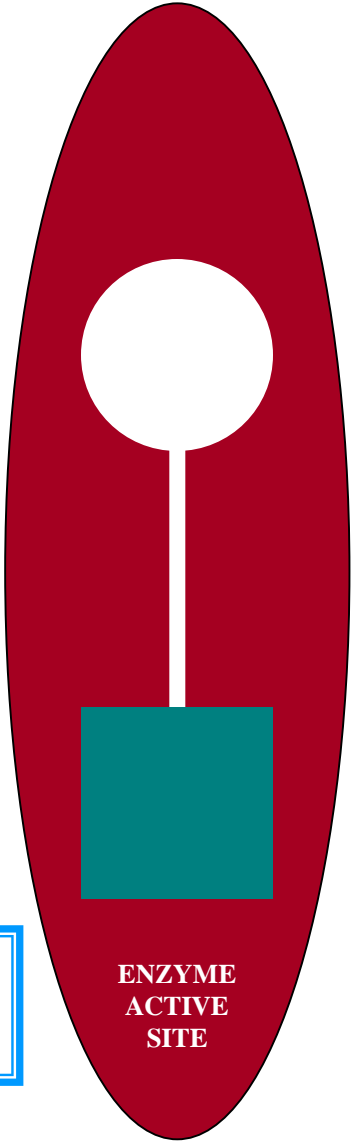




**COMPETITIVE  
INHIBITOR**



**SUBSTRATE**

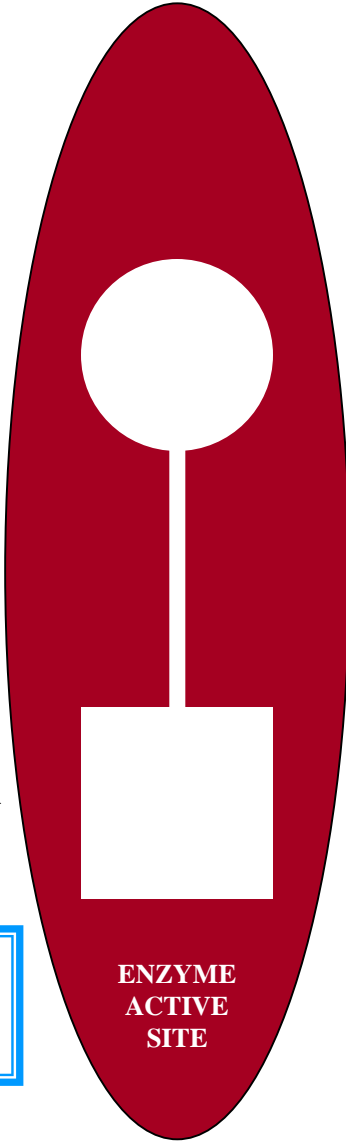


ENZYME  
ACTIVE  
SITE

**ENZYME**

**NO  
PRODUCT  
OUTPUT**

**COMPETITIVE  
INHIBITOR**



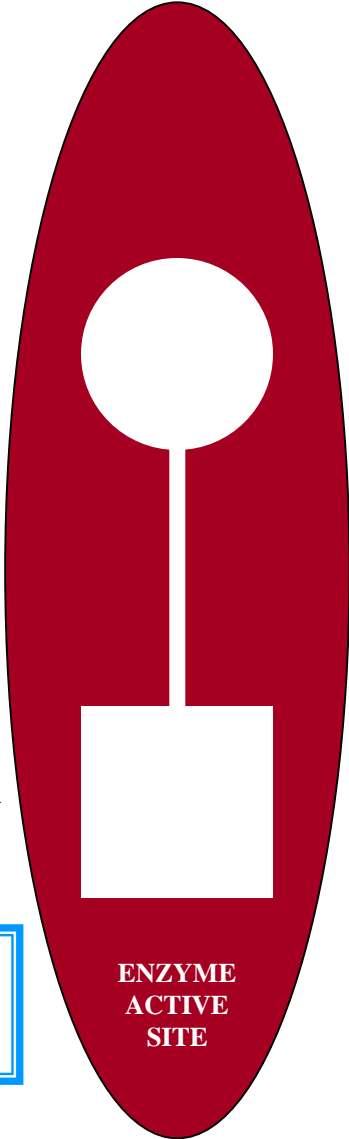
**?  
ENZYME  
INHIBITOR**



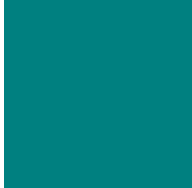
**SUBSTRATE**

**ENZYME**

**COMPETITIVE  
INHIBITOR**



**COMPETITIVE  
ENZYME  
INHIBITOR**



**SUBSTRATE**

**ENZYME**

# NON-COMPETITIVE INHIBITOR