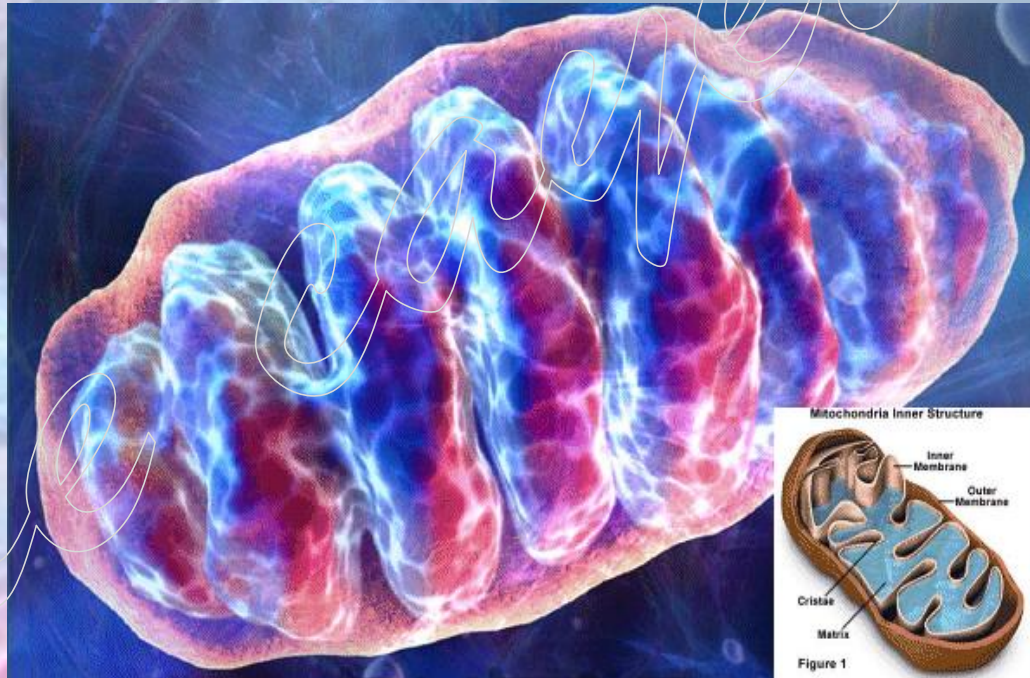


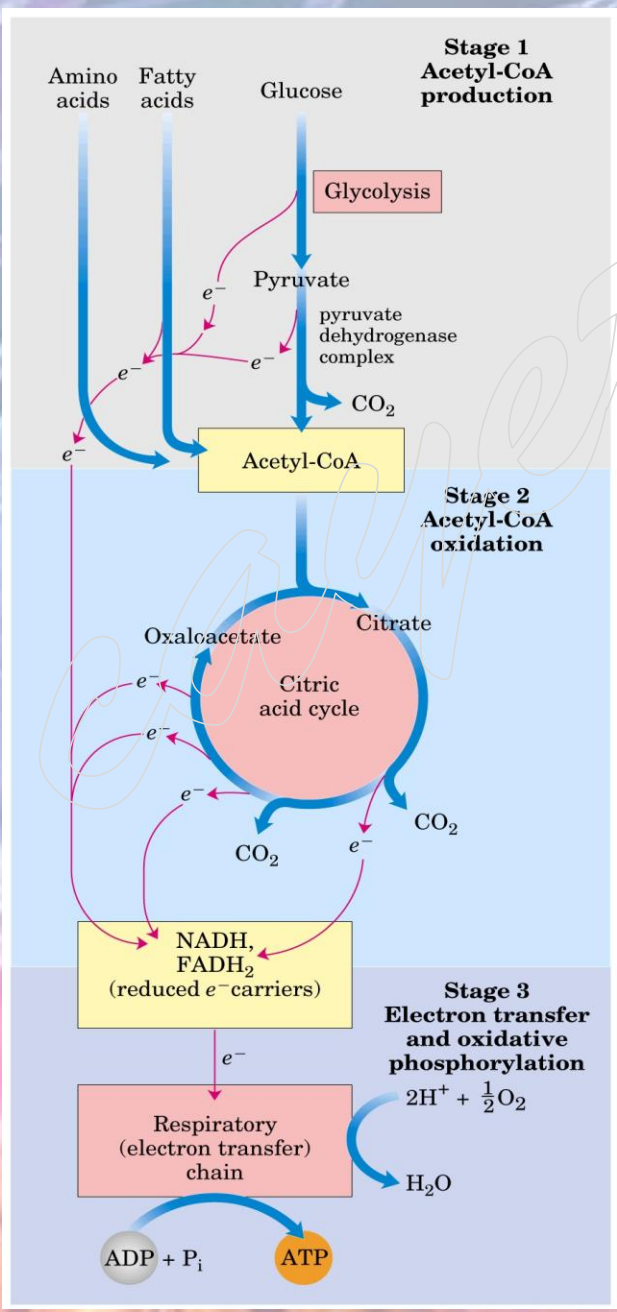
**UNIVERSIDAD PERUANA CAYETANO HEREDIA  
CENTRO FORMATIVO PREUNIVERSITARIO**

**BIOLOGÍA**

**GLUCOLISIS**

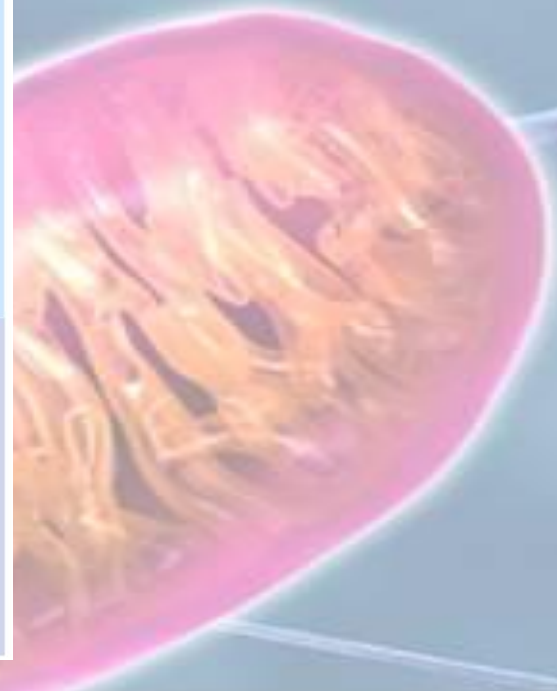


# GLUCOLYSIS



Handwritten text: *mitochondria*

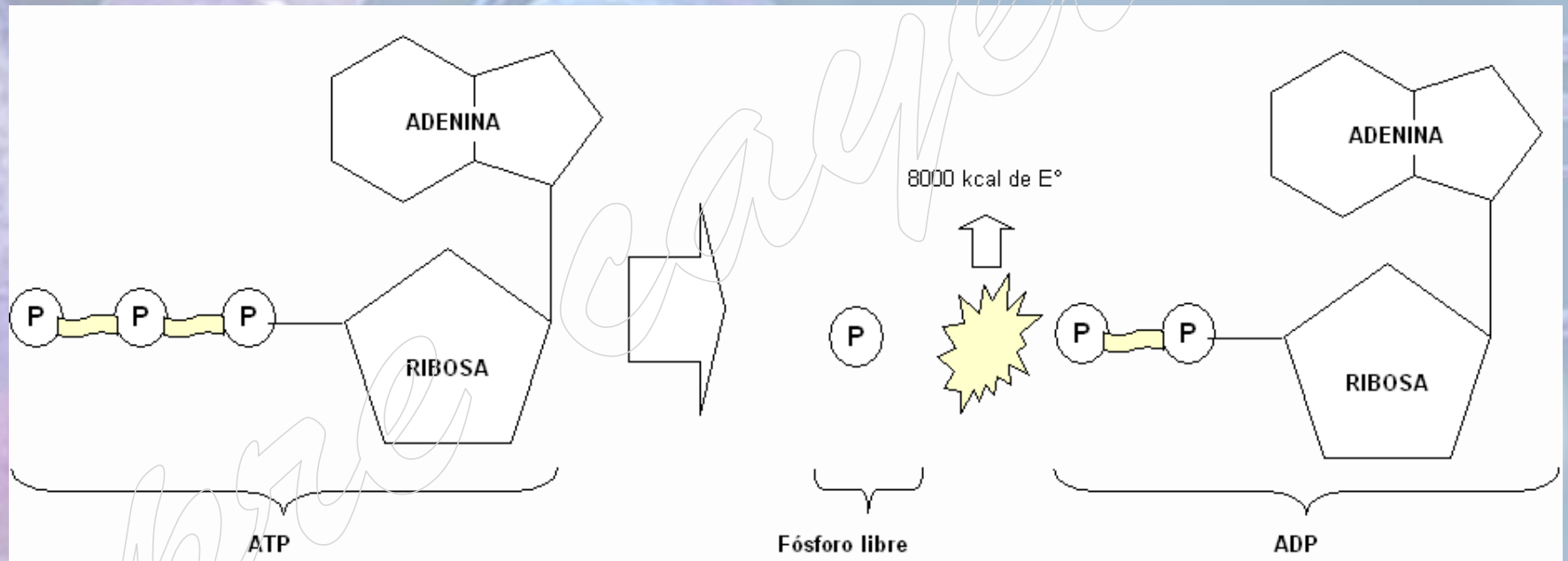
Handwritten text: *mitochondria*



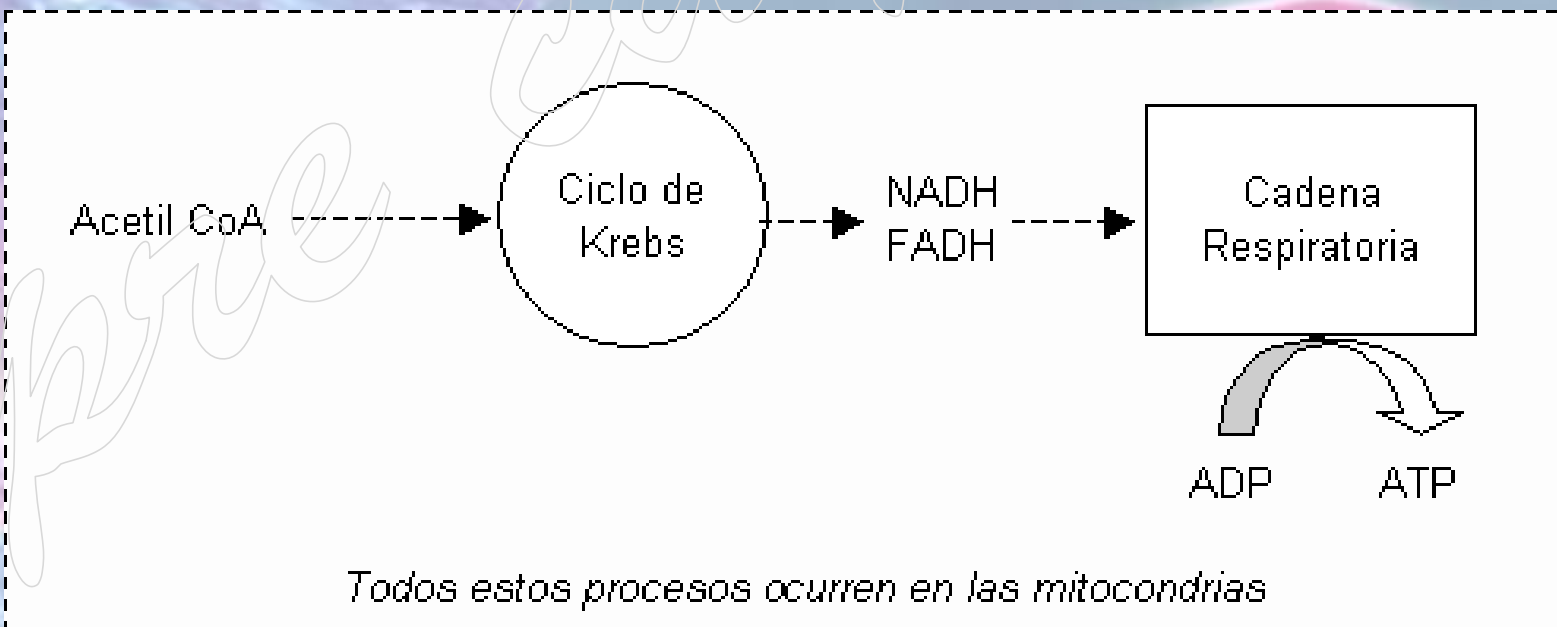
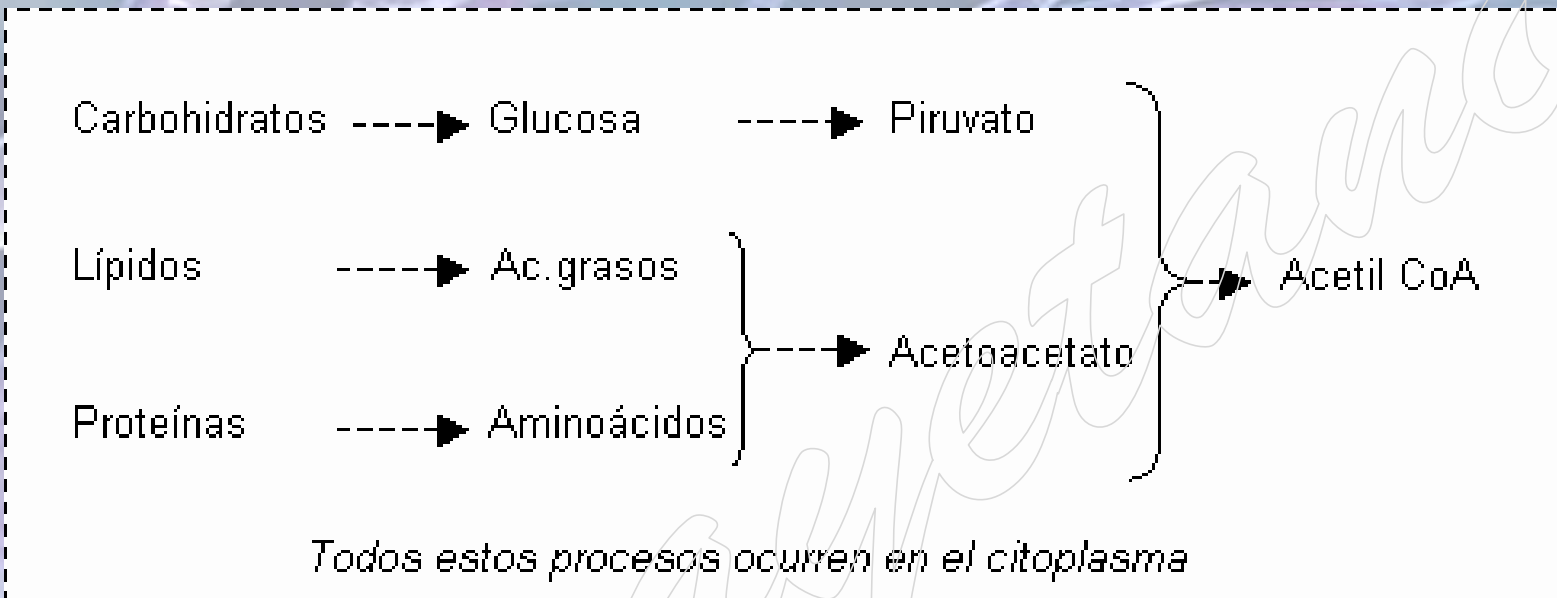


# ATP (ADENOSIN TRIFOSFATO)

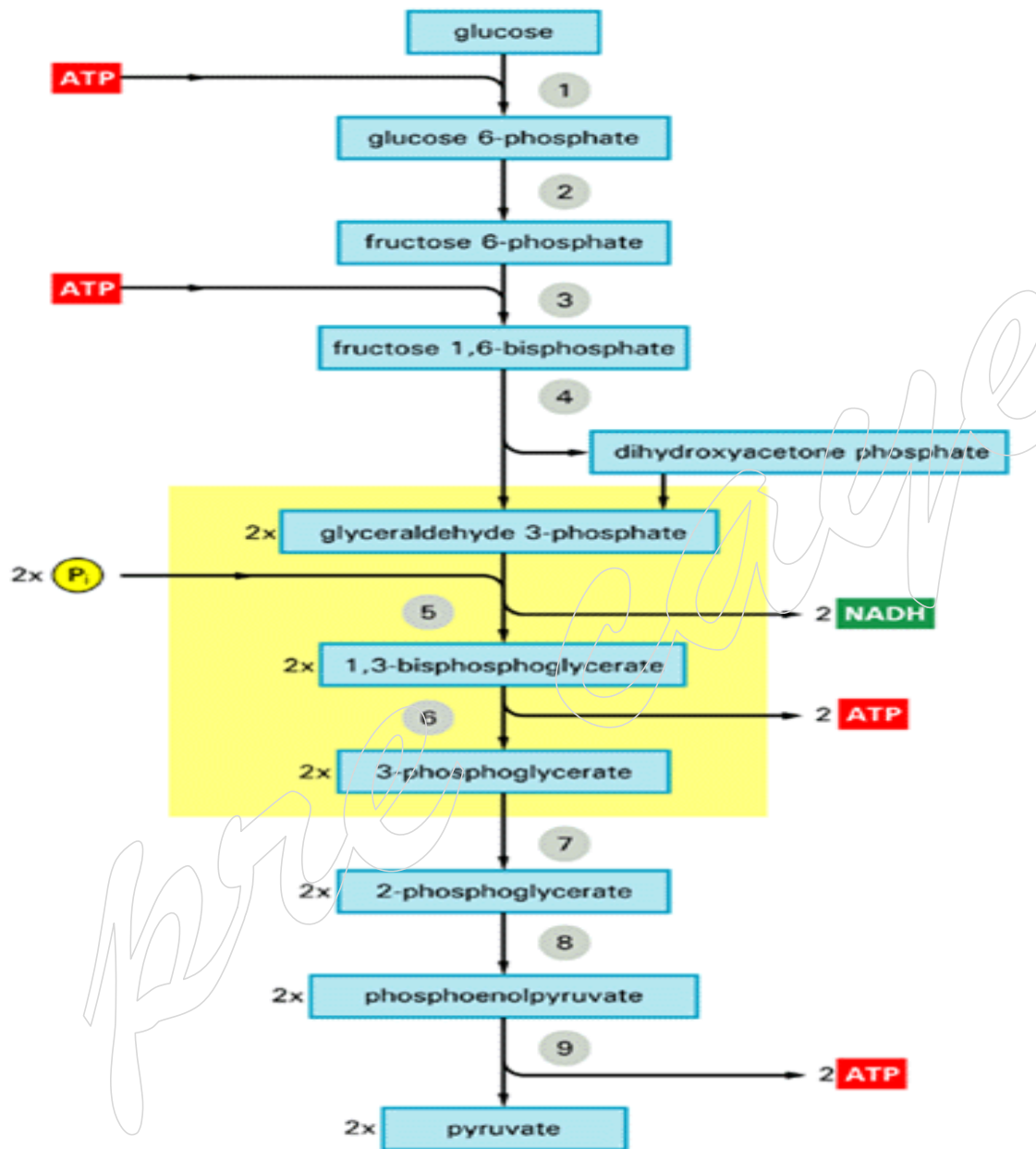
## Estructura



# GLUCOLISIS



# GLUCOLISIS



## ENZIMAS:

1. Hexoquinasa
2. Glucosa fosfato isomerasa
3. Fosfofructoquinasa
4. Aldolasa
5. Triosa fosfato isomerasa
6. Gliceraldehido 3 fosfato deshidrogenasa
7. 3 fosfoglicerato quinasa
8. Mutasa
9. Enolasa
10. Piruvato quinasa

# GLUCOLISIS

(a)

## GLUCOSA

first priming reaction

1



Glucosa - 6 - Fosfato

2

Fructosa - 6 - Fosfato

second priming reaction

3



Fructosa 1,6 - difosfato

cleavage of 6-carbon sugar phosphate to two 3-carbon sugar phosphates

4

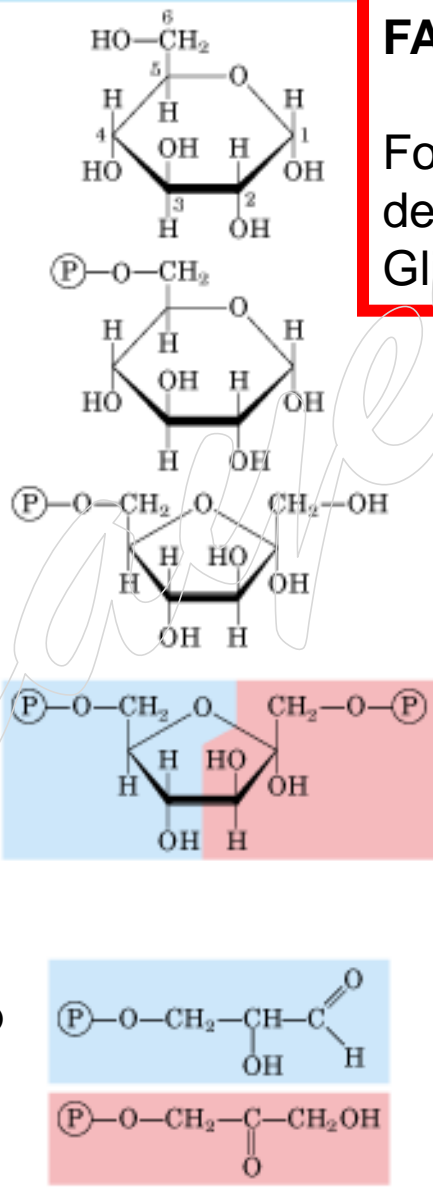
Glicer aldehido - 3 - Fosfato

+

Dihidroxicetona - 3 - Fosfato

5

**FASE PREPARATORIA**  
Fosforilacion y conversión de la glucosa en Glicer aldehido - 3 - Fosfato



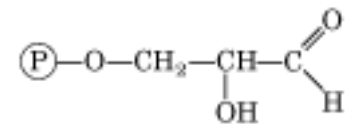
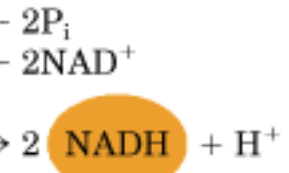
# GLUCOLISIS

(b)

## Gliceraldehido - 3 - Fosfato

oxidation and phosphorylation

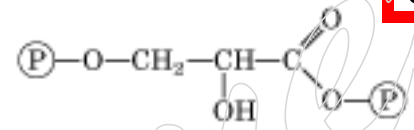
6



## 1,3 - Difosfoglicerato

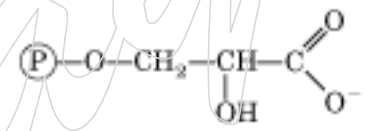
first ATP-forming reaction (substrate-level phosphorylation)

7



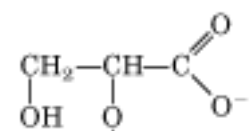
## 3 Fosfoglicerato

8



## 2 Fosfoglicerato

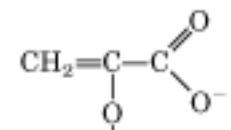
9



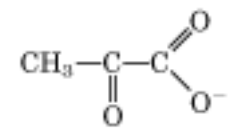
## Fosfoenolpiruvato

second ATP-forming reaction (substrate-level phosphorylation)

10



## PIRUVATO

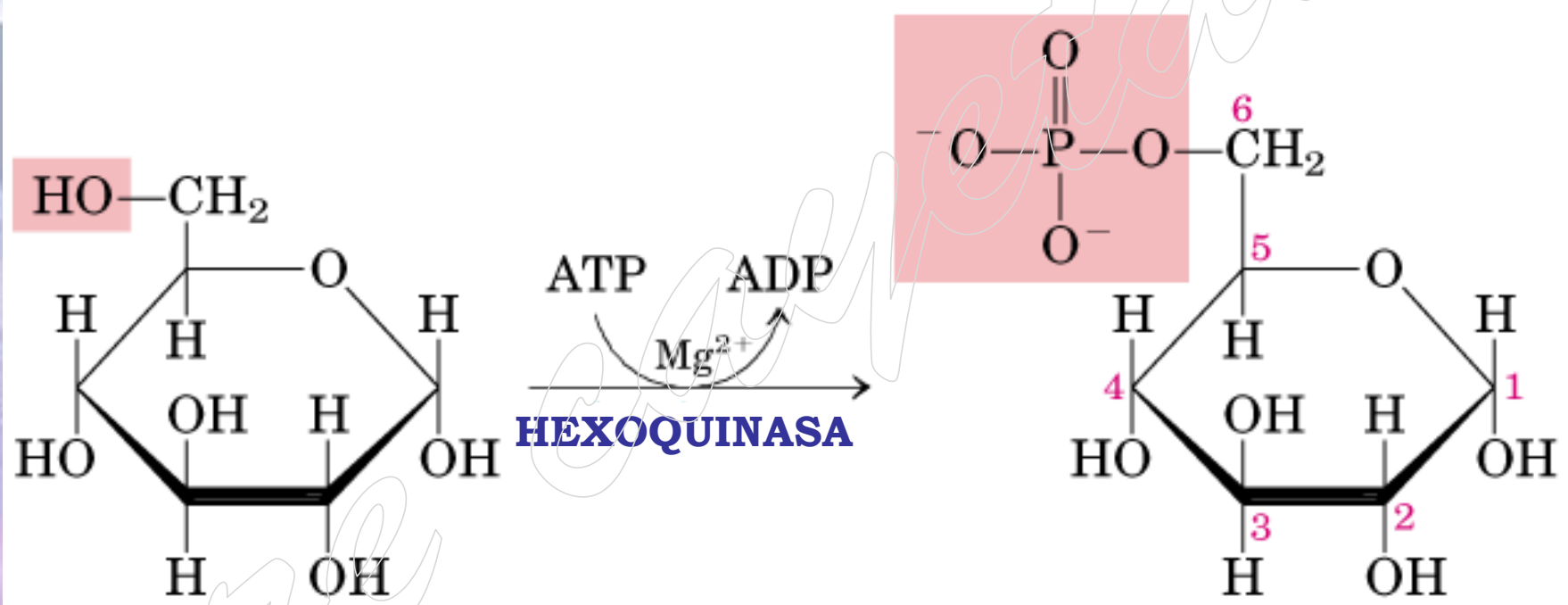


### FASE DE BENEFICIOS

Conversión de Gliceraldehido - 3 - Fosfato en Piruvato y formación acoplada de ATP



# FASE I



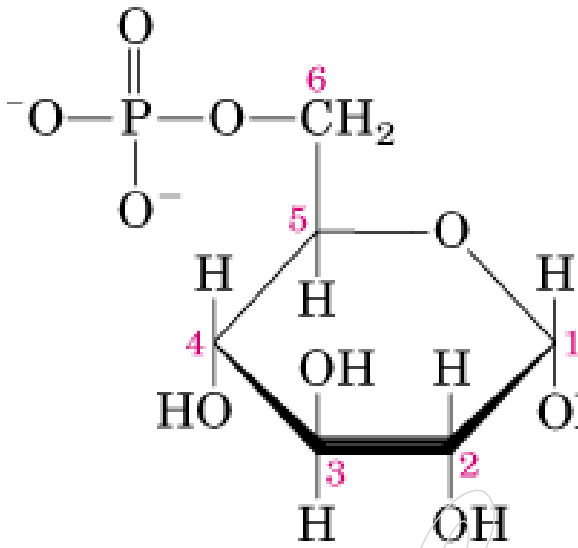
**GLUCOSA**

**GLUCOSA - 6 - FOSFATO**

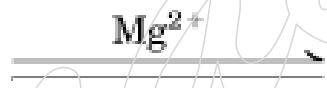
$\Delta G'^{\circ} = -16.7 \text{ kJ/mol}$



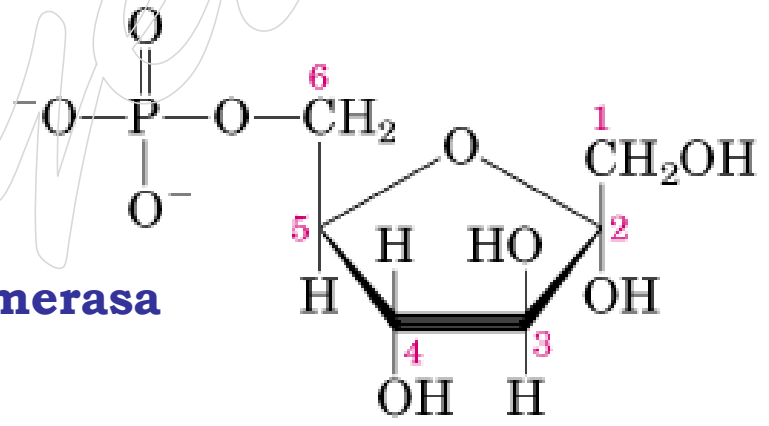
# GLUCOLISIS



**GLUCOSA - 6 - FOSFATO**



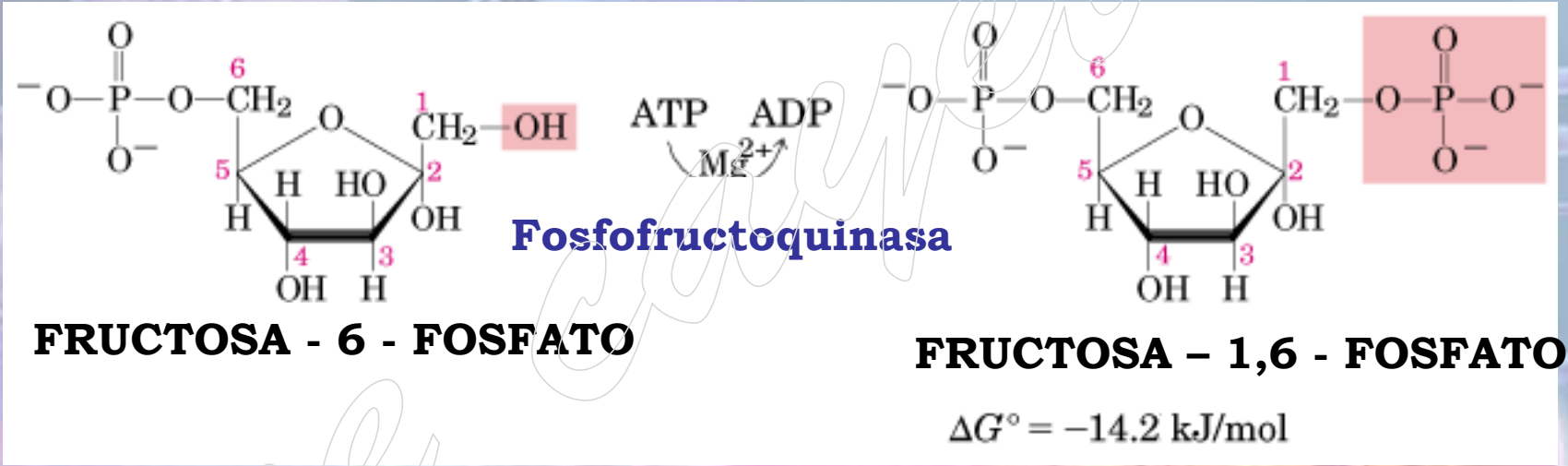
**Fosfoglucoisomerasa**



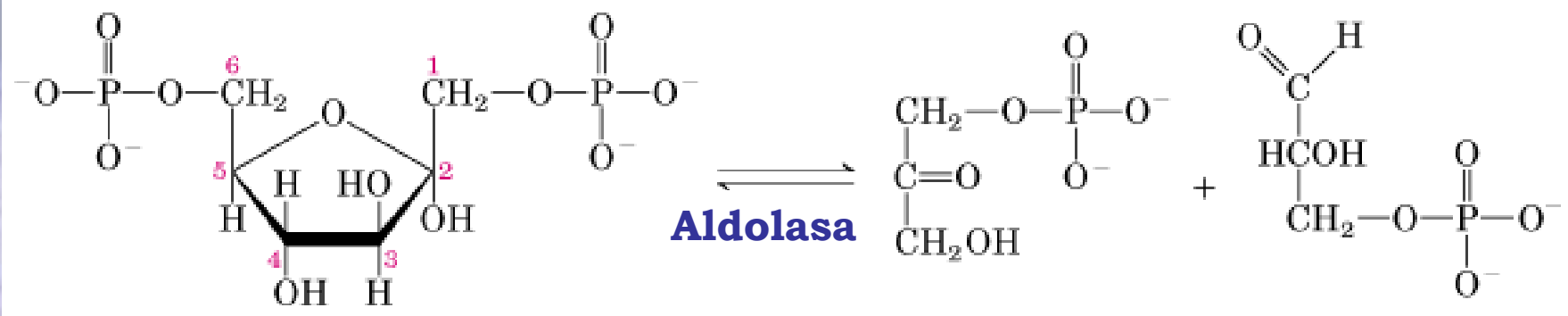
**FRUCTOSA - 6 - FOSFATO**

$\Delta G'^{\circ} = 1.7 \text{ kJ/mol}$

# GLUCOLISIS



# GLUCOLISIS



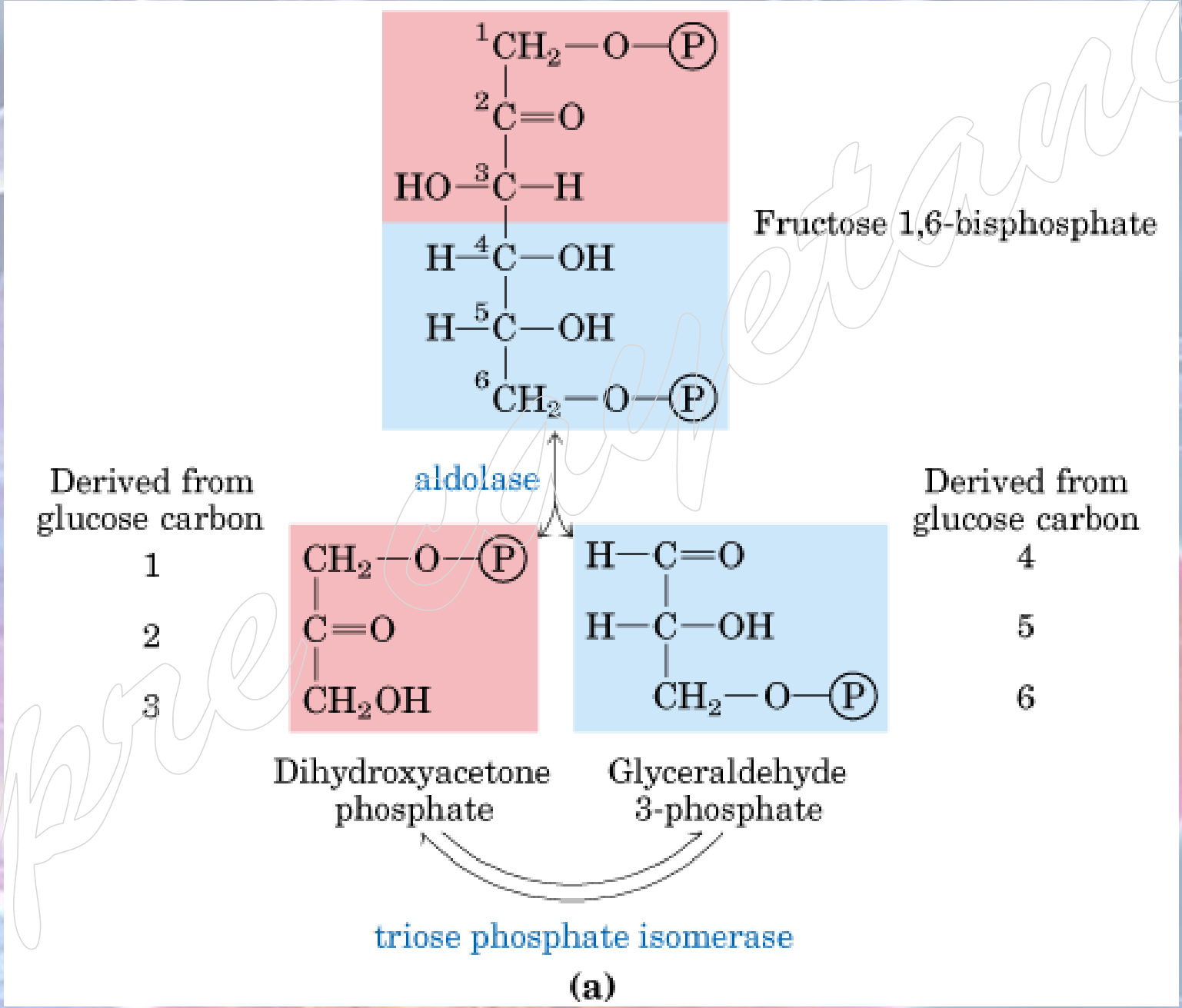
**FRUCTOSA - 1,6 - FOSFATO**

**DIHIDROXICETONA FOSFATO**

**GLICERALDEHIDO - 3 - FOSFATO**

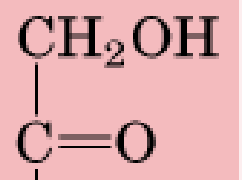
$$\Delta G'^{\circ} = 23.8 \text{kJ/mol}$$

# GLUCOLYSIS

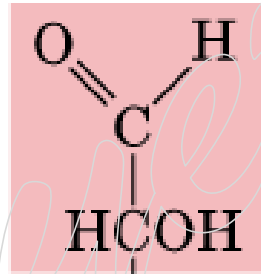




# GLUCOLISIS



**DIHIDROXICETONA  
FOSFATO**

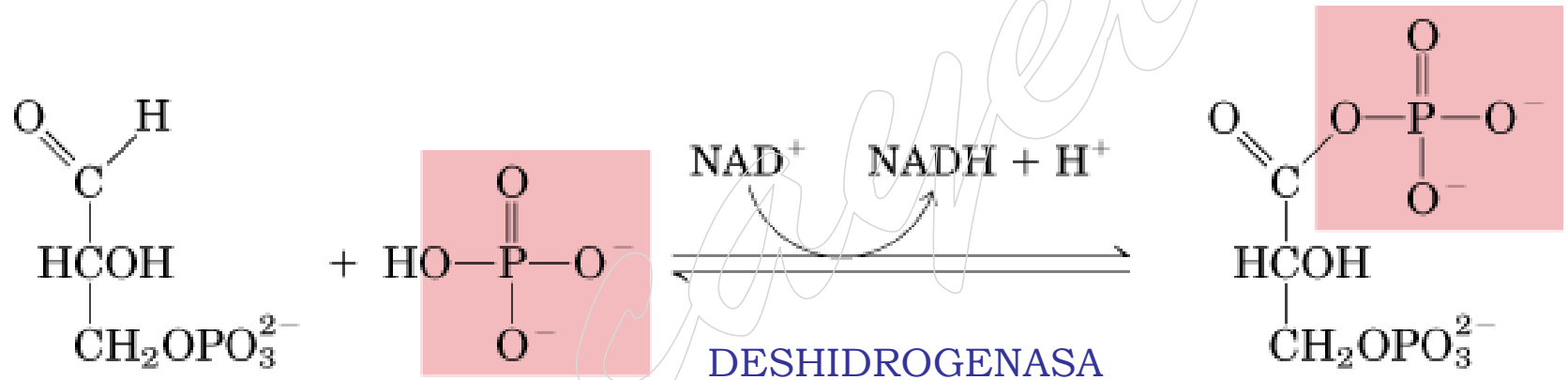


**GLICERALDEHIDO - 3 -  
FOSFATO**

$\Delta G'^{\circ} = 7.5 \text{ kJ/mol}$

# GLUCOLISIS

## FASE II

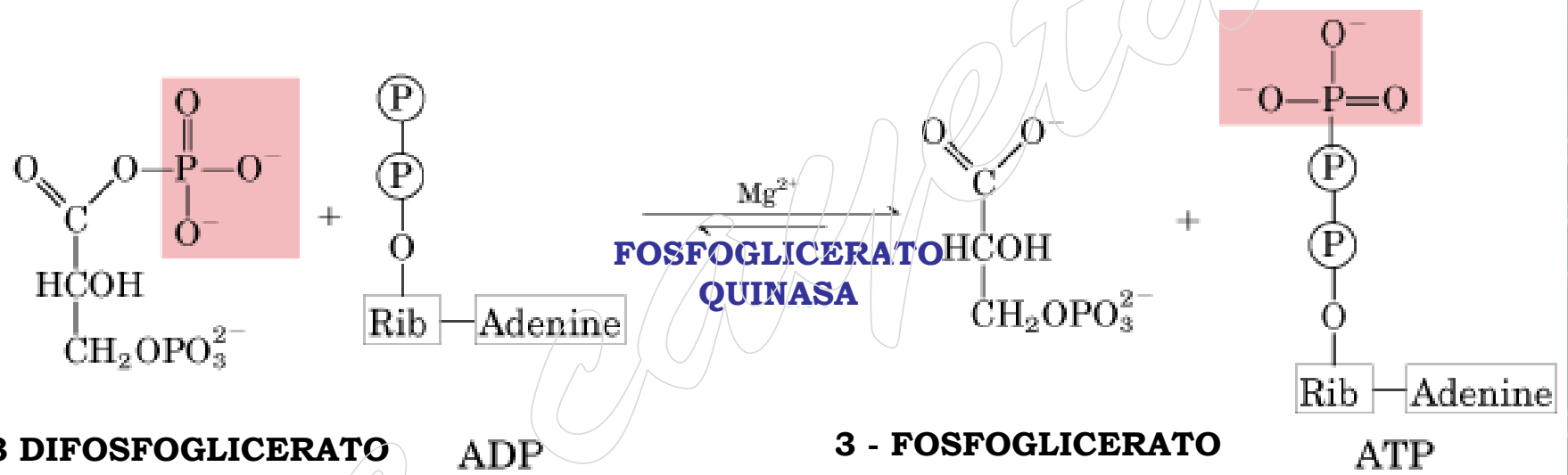


**GLICERALDEHIDO - 3 - FOSFATO FOSFATO** + **FOSFATO INORGANICO**

**1,3 DIFOSFOGLICERATO**

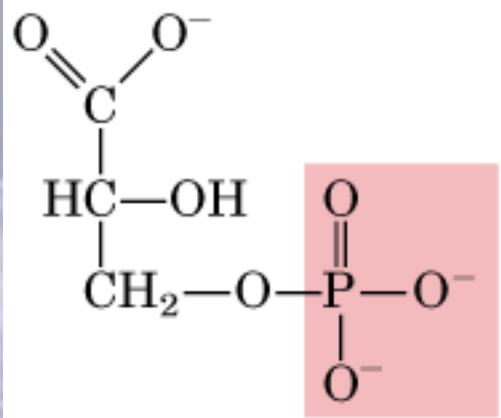
$$\Delta G'^{\circ} = 6.3 \text{ kJ/mol}$$

# GLUCOLISIS

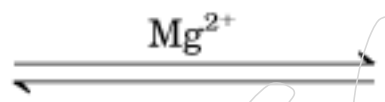


$$\Delta G'^{\circ} = -18.5 \text{ kJ/mol}$$

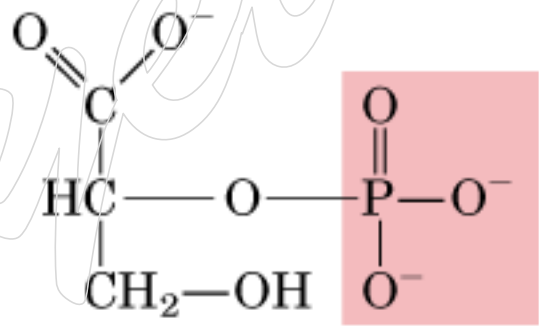
# GLUCOLISIS



**3 - FOSFOGLICERATO**



**MUTASA**

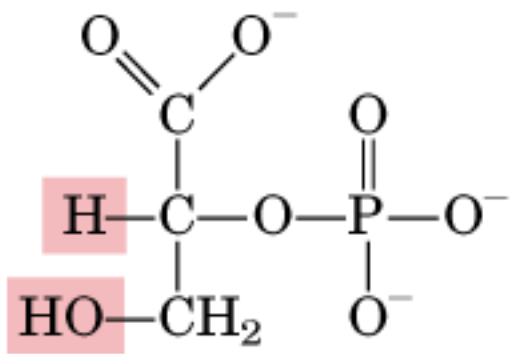


**2 - FOSFOGLICERATO**

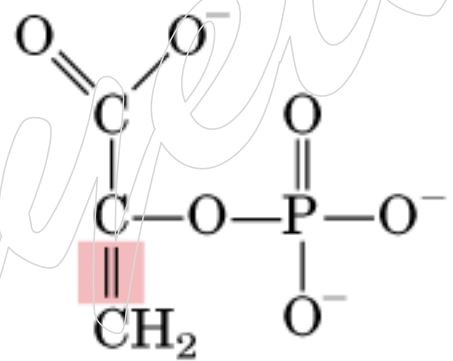
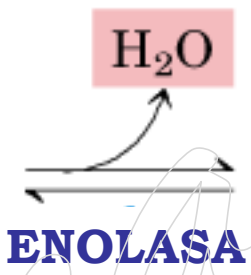
$$\Delta G'^{\circ} = 4.4 \text{ kJ/mol}$$



# GLUCOLISIS



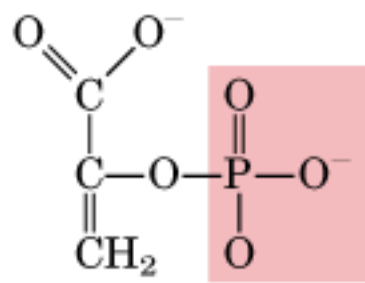
**2 - FOSFOGLICERATO**



**FOSFOENOLPIRUVATO**

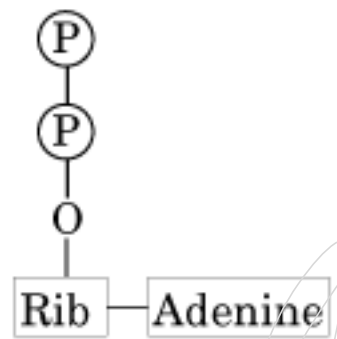
$$\Delta G'^{\circ} = 7.5 \text{ kJ/mol}$$

# GLUCOLISIS



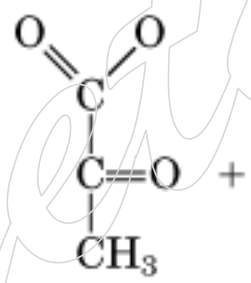
**FOSFOENOLPIRUVATO**

+

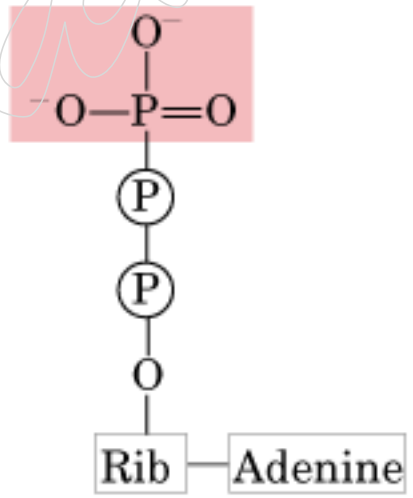


**ADP**

$Mg^{2+}, K^{+}$   
→  
**PIRUVATO  
QUINASA**



**PIRUVATO**



**ATP**

$\Delta G'^{\circ} = -31.4 \text{ kJ/mol}$

## BALANCE DE LA GLUCOLISIS

**Resumen de compuestos que ingresan y productos que salen del proceso**

**Entradas:**

**Glucosa + 2 ATP + 4 ADP + 2 Pi + 2 NAD**

**Salidas:**

**2 piruvatos + 2 ADP + 4 ATP + 2 NADH + H<sub>2</sub>O**



# GLUCOLISIS

**GLUCOSA**

Glucólisis  
10 reacciones  
sucesivas

Condiciones  
anaeróbicas

**PIRUVATO**

Condiciones  
anaeróbicas

**2 ETANOL**

**2CO<sub>2</sub>**

Condiciones  
aeróbicas

**2 LACTATO**

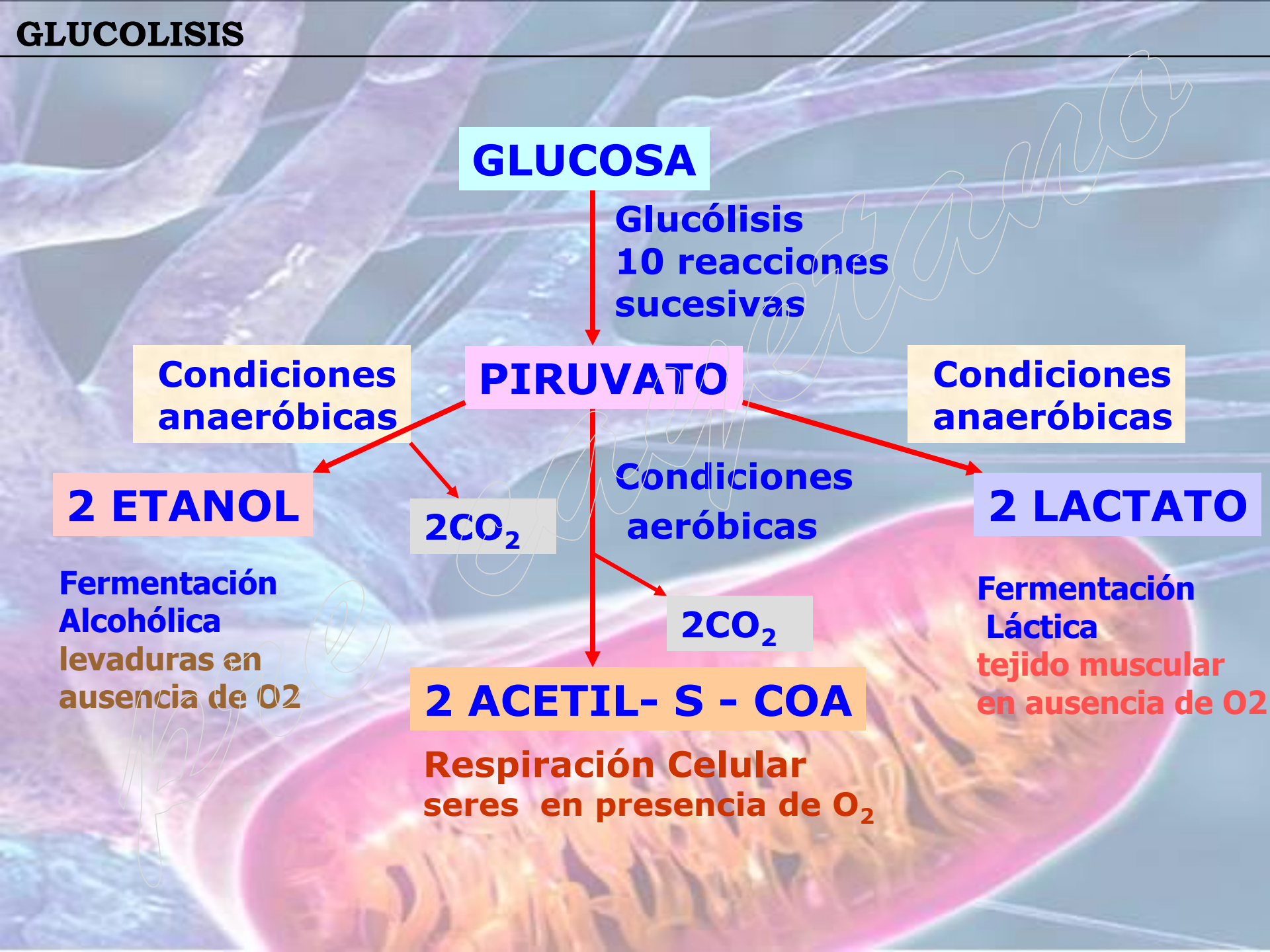
Fermentación  
Alcohólica  
levaduras en  
ausencia de O<sub>2</sub>

**2CO<sub>2</sub>**

**2 ACETIL- S - COA**

Fermentación  
Láctica  
tejido muscular  
en ausencia de O<sub>2</sub>

Respiración Celular  
seres en presencia de O<sub>2</sub>

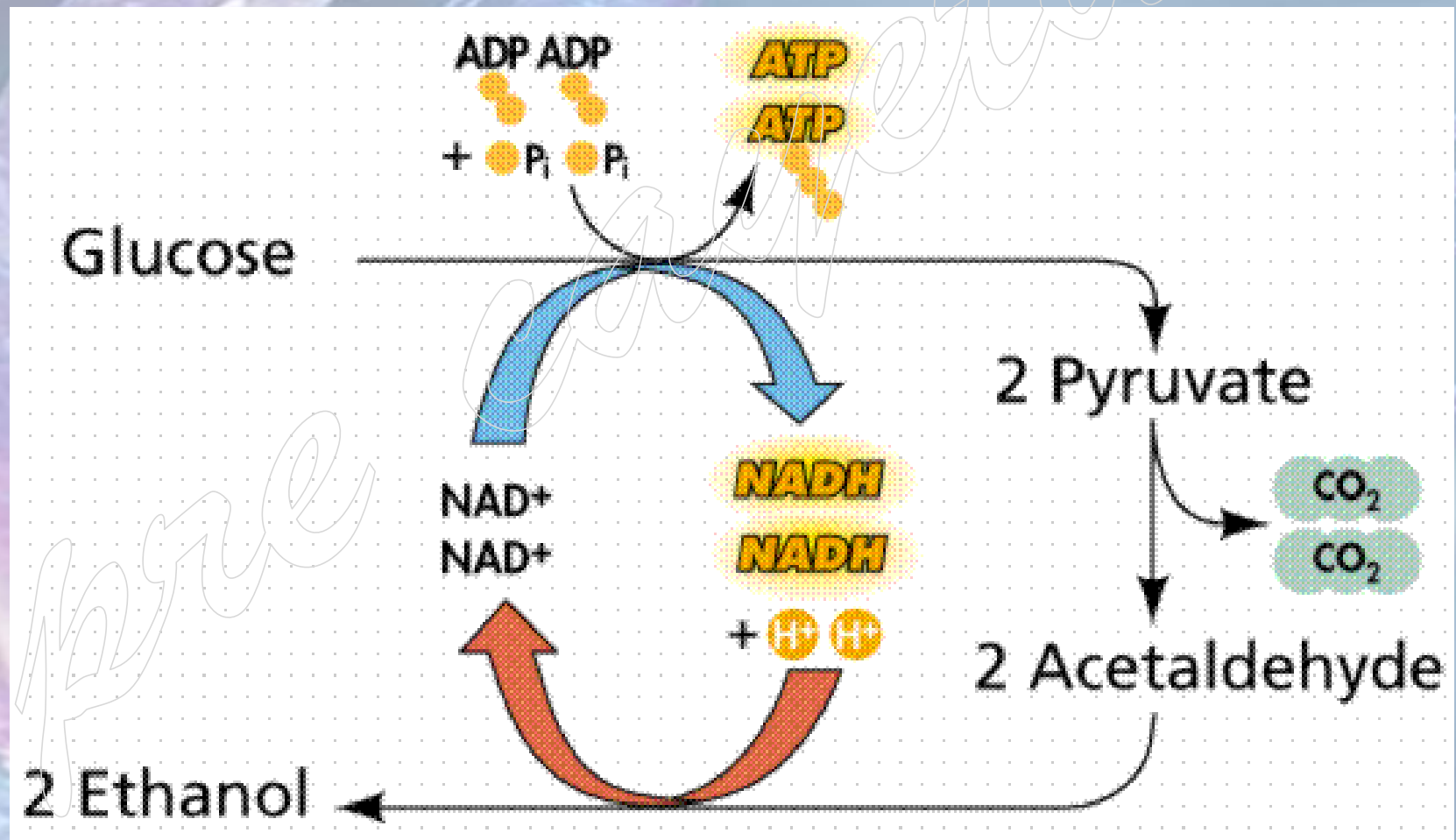




# GLUCOLYSIS

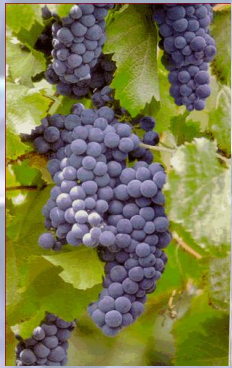


# VIA ANAEROBIA FERMENTACION ALCOHOLICA



# GLUCOLISIS ANAEROBICA

## Producción de Vino



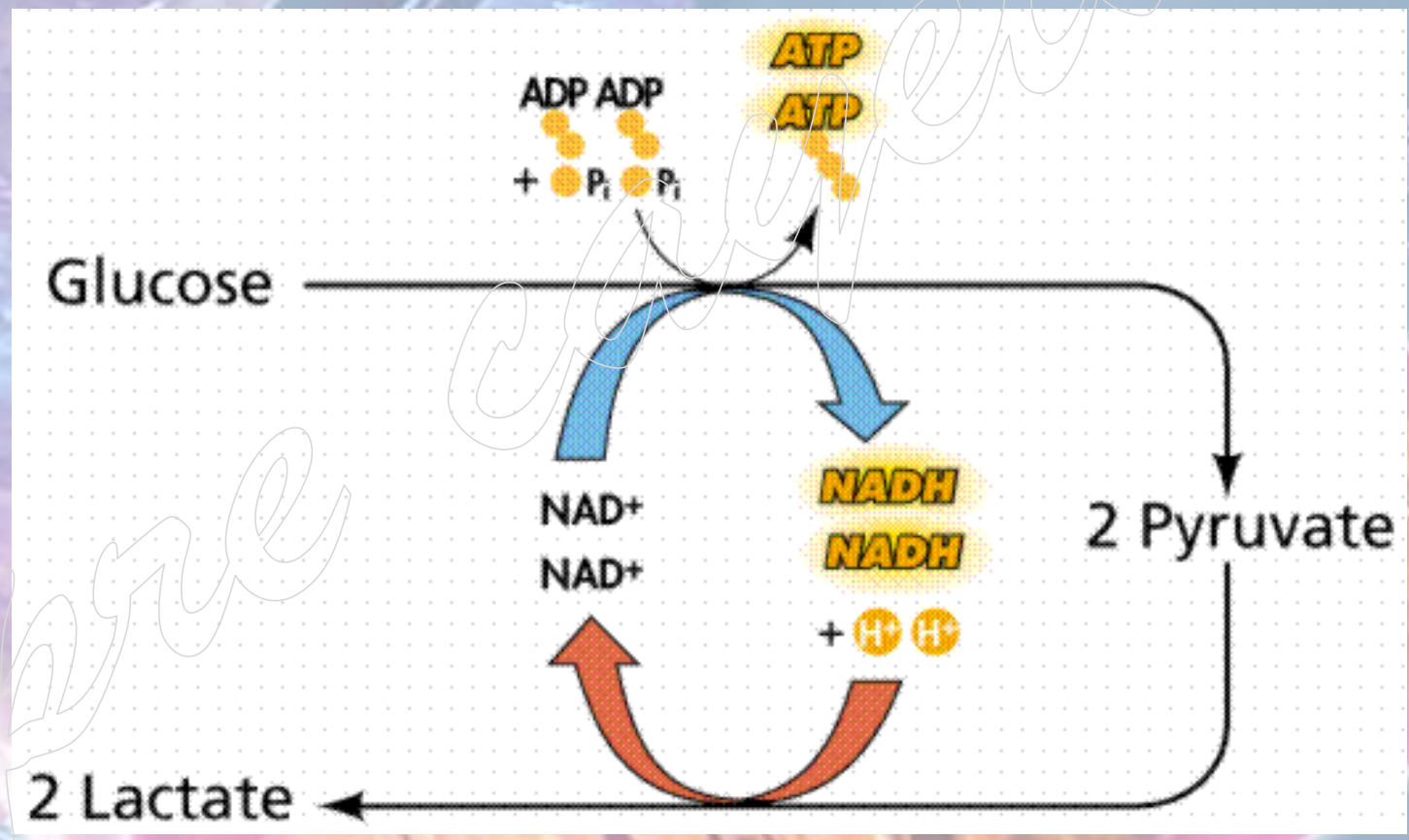
Rose wines





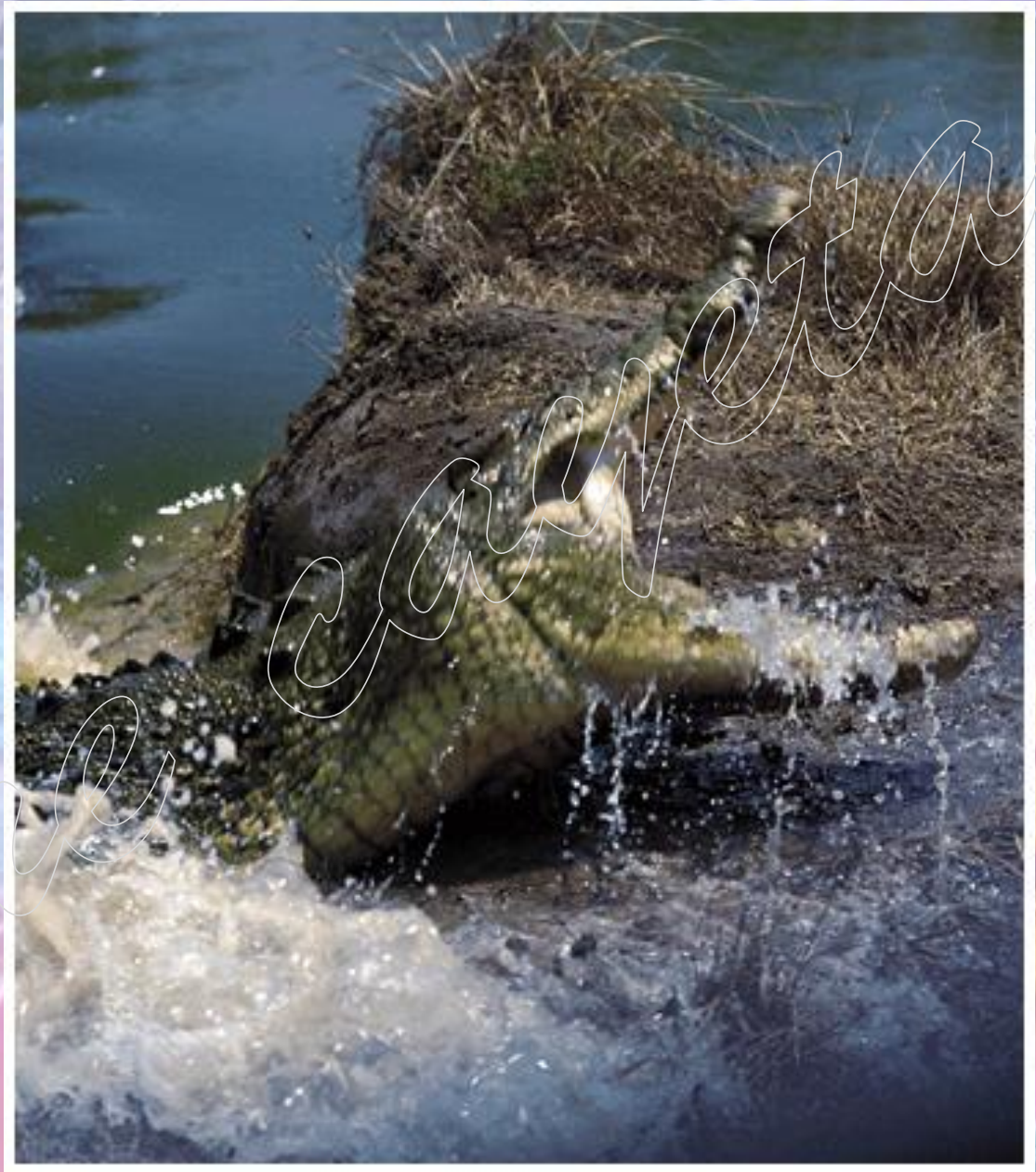
# GLUCOLISIS ANAEROBICA

# VIA ANAEROBIA FERMENTACION LACTICA

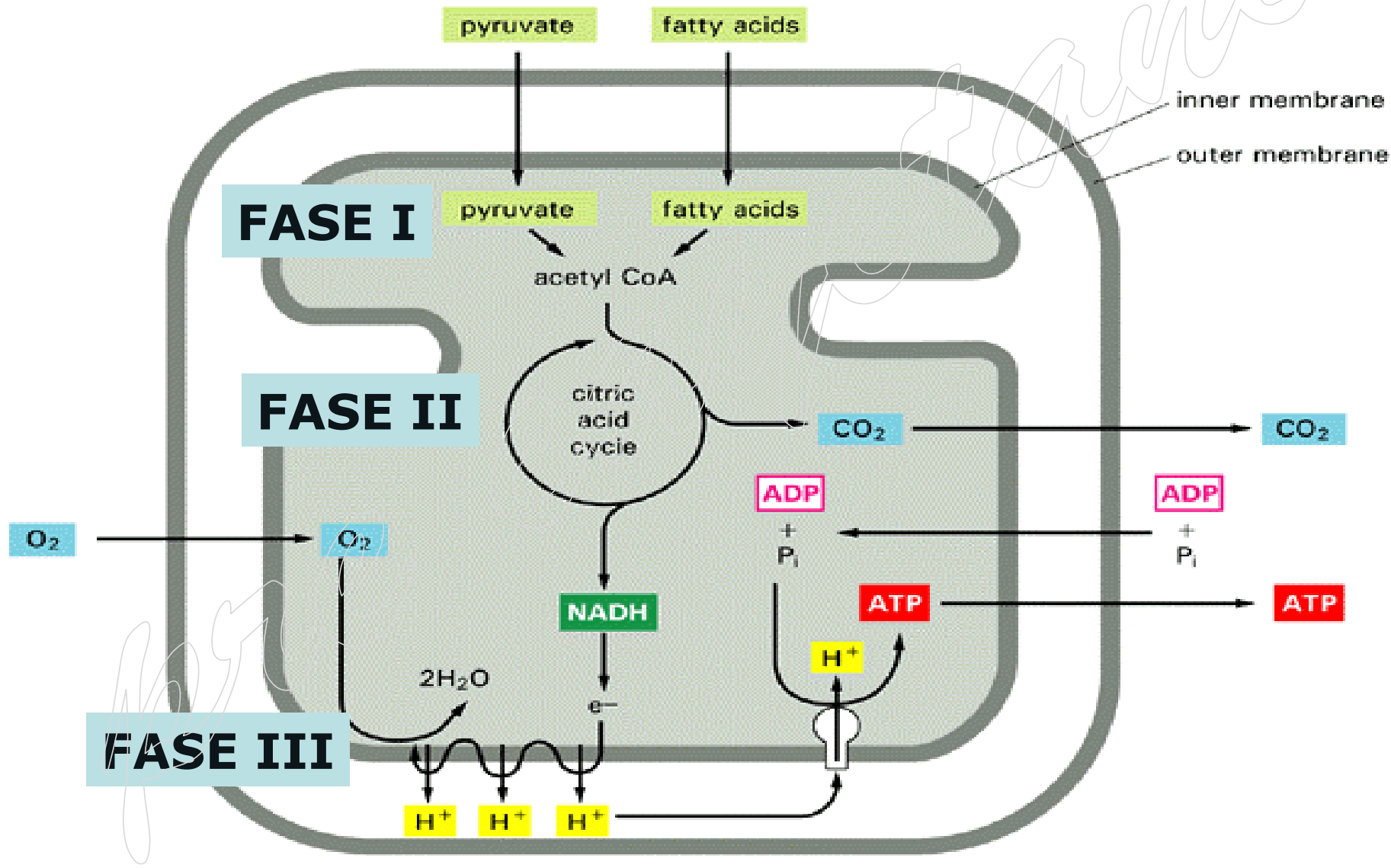




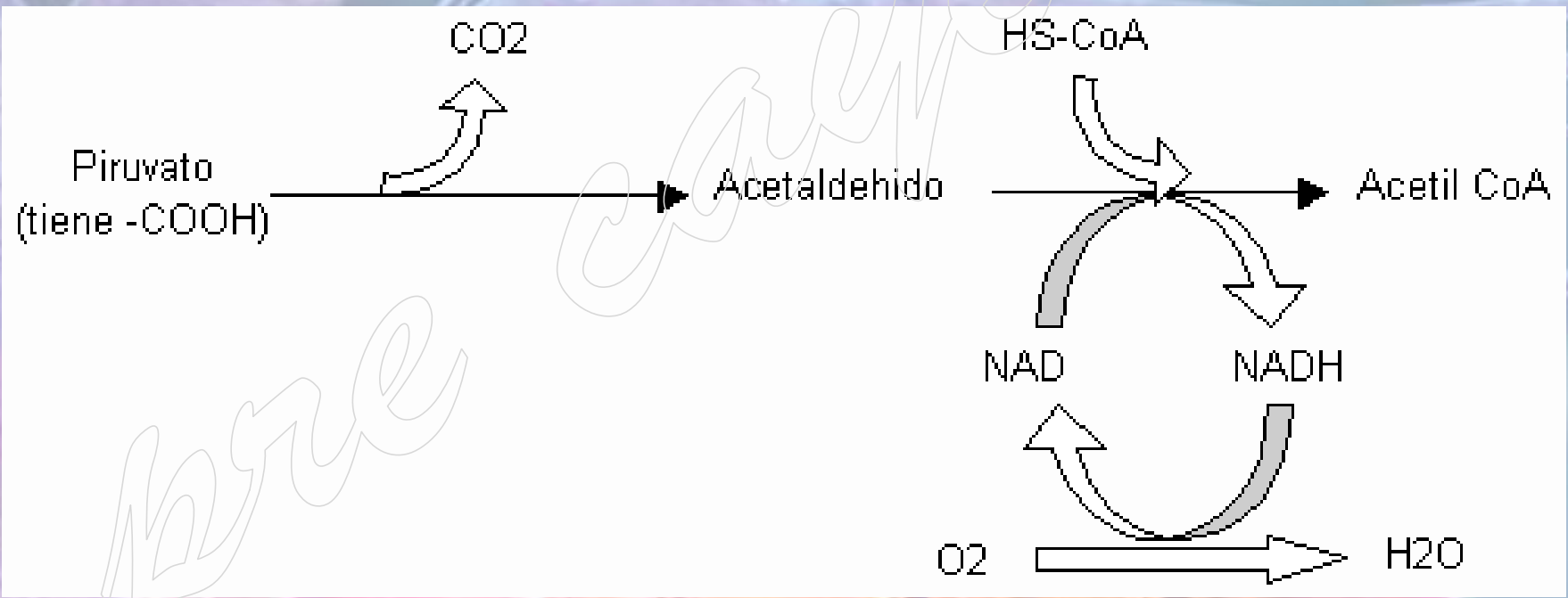
# GLUCOLISIS ANAEROBICA



# GLUCOLISIS AEROBICA

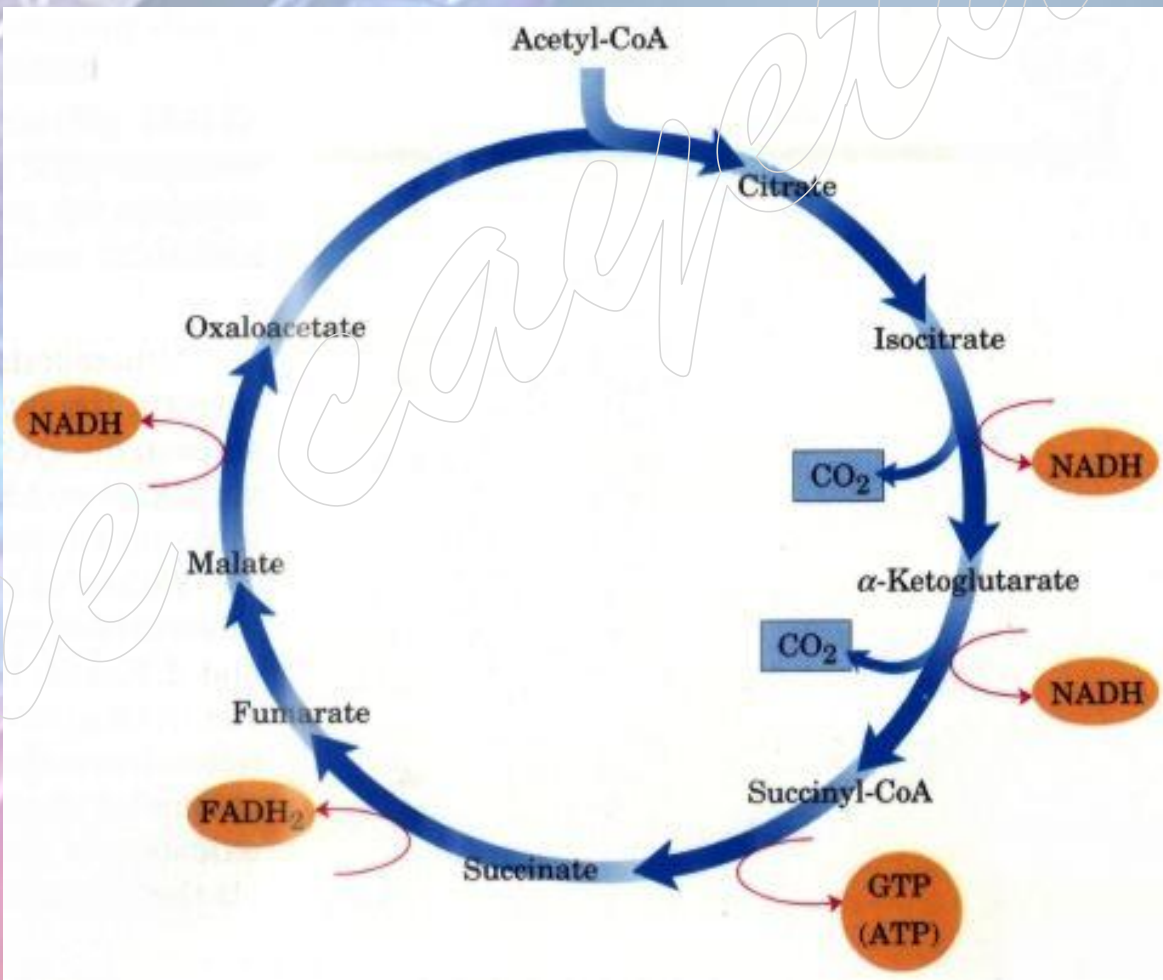


# FASE I RESPIRACION CELULAR



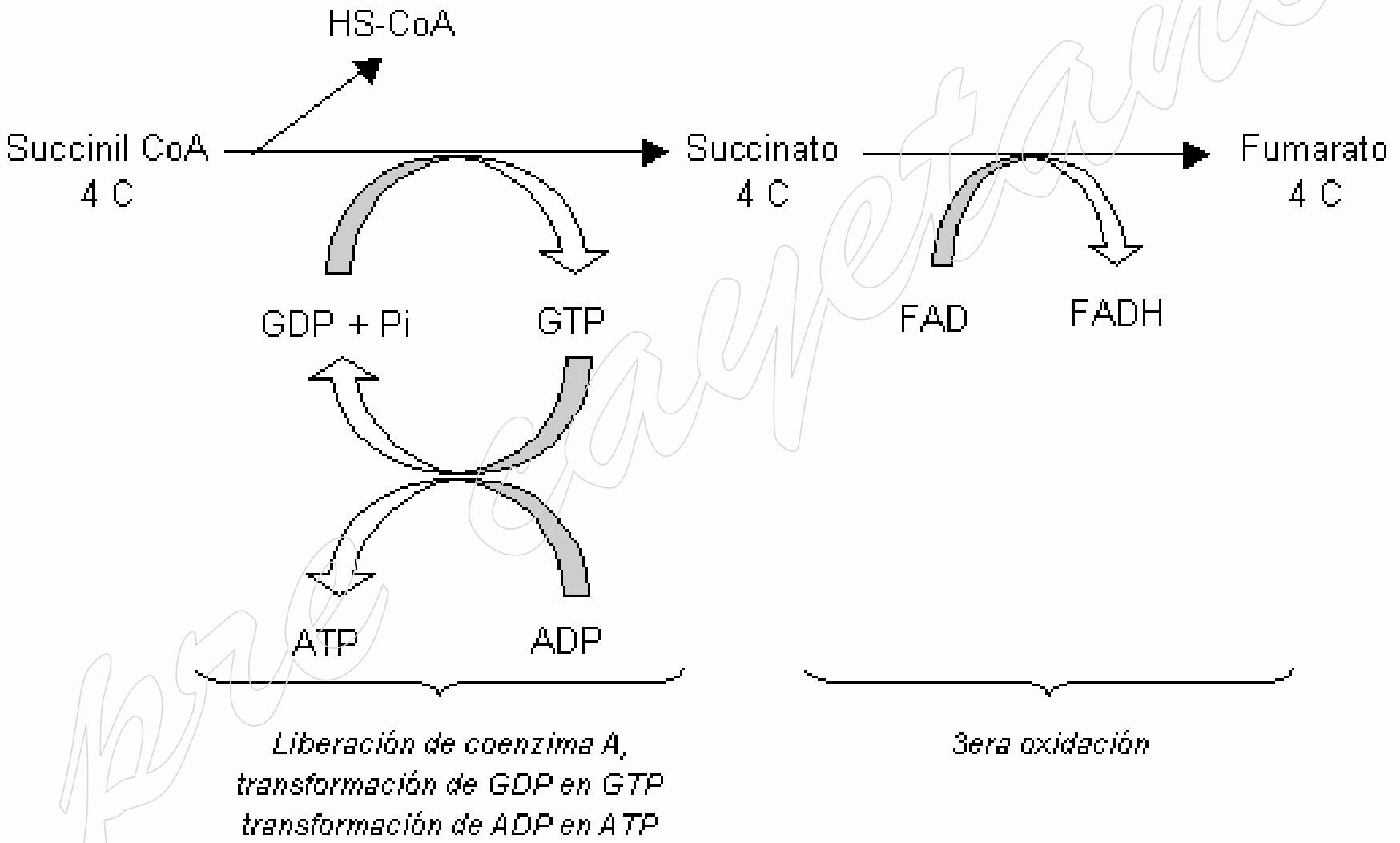


# **FASE II CICLO DE KREBS**

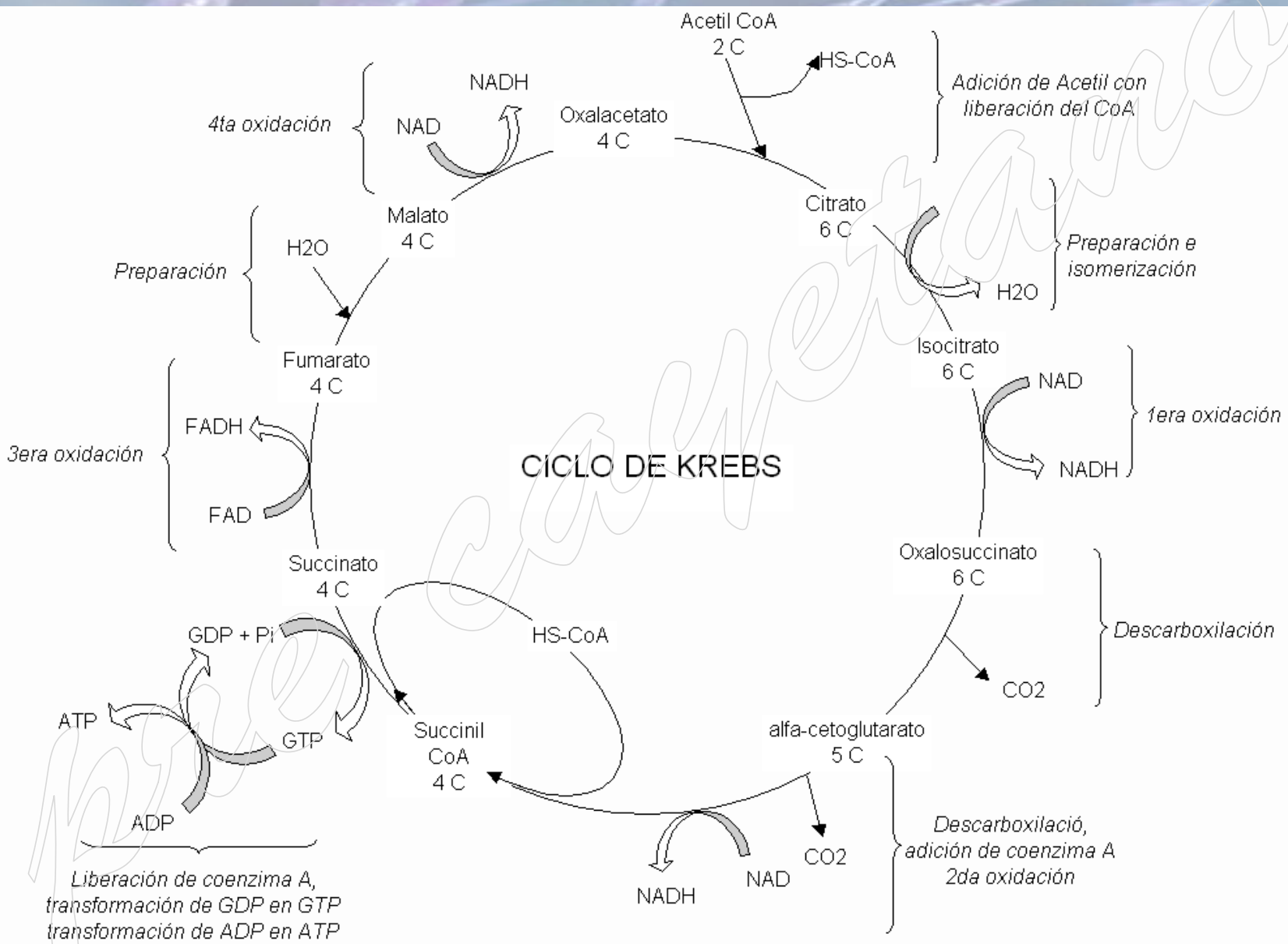




# GLUCOLISIS AEROBICA



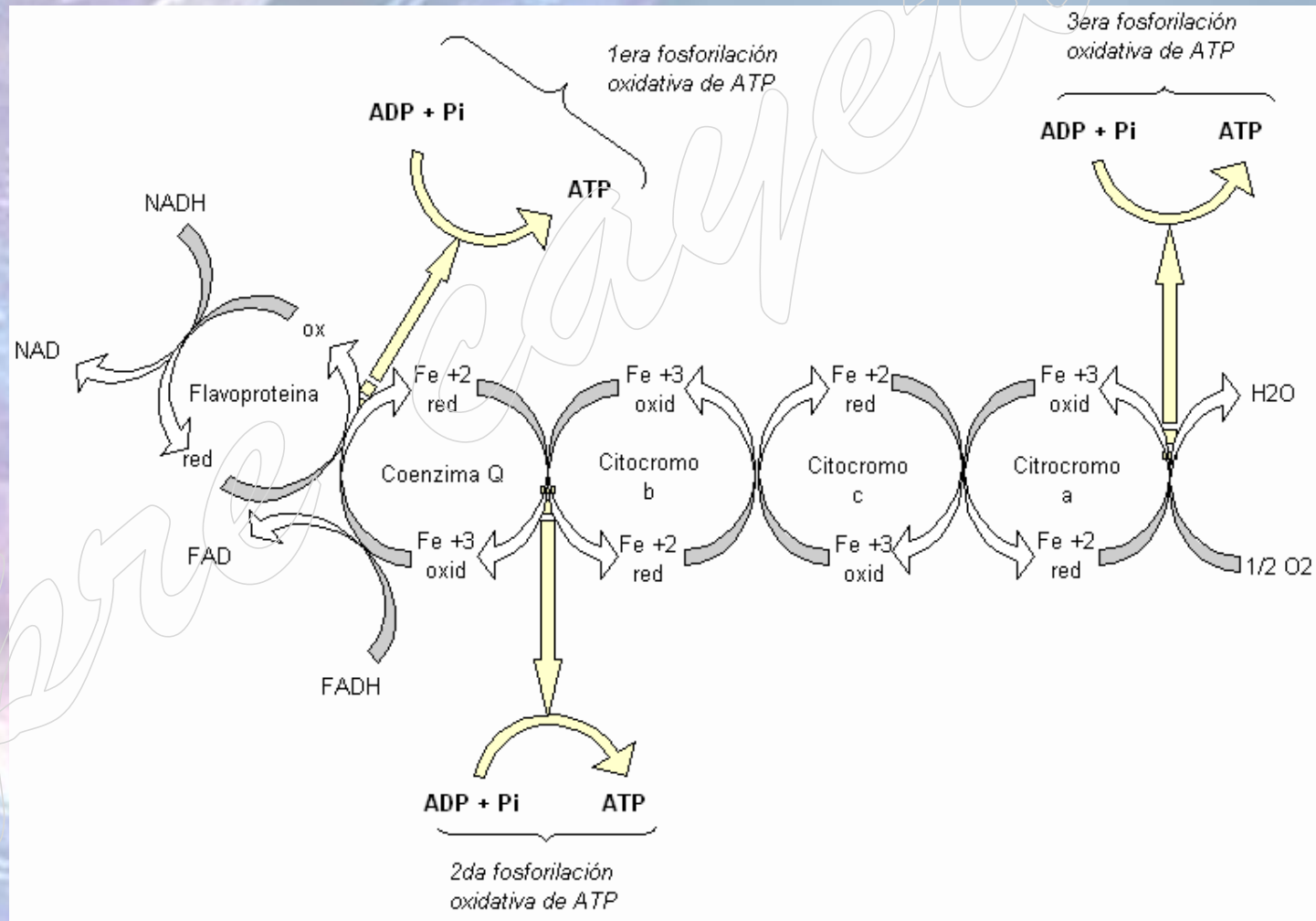
# GLUCOLISIS AEROBICA



## BALANCE

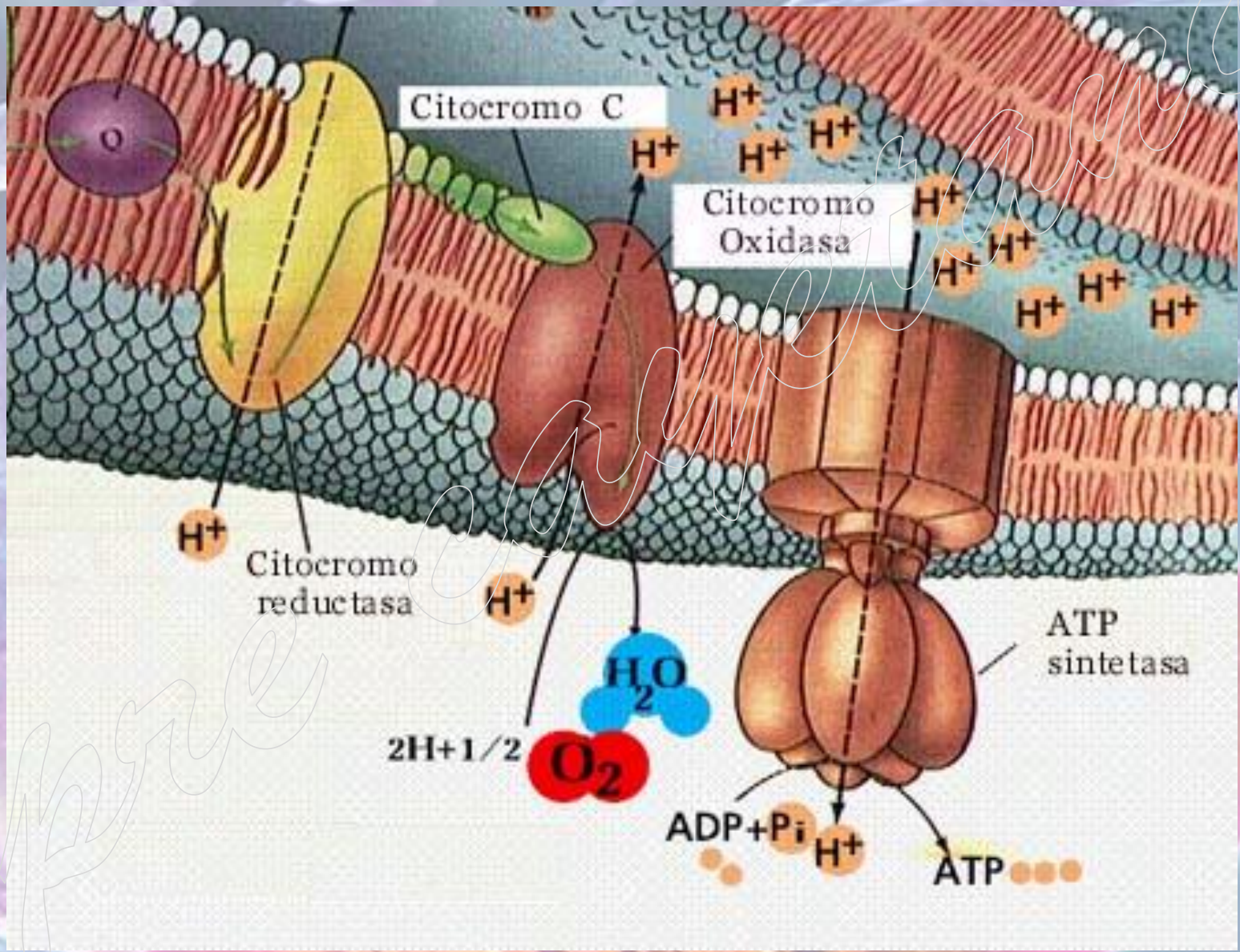
Proceso metabólico:	ATP s	NADH s	FADH s
Glucólisis	2	2	-
Metabolismo de piruvato a Acetil CoA (x2)	-	2	-
Ciclo de Krebs (x2)	2	6	2
<b>TOTAL:</b>	<b>4</b>	<b>10</b>	<b>2</b>

## FASE III TRANSPORTE ELECTRONICO Y SINTESIS DE ATP

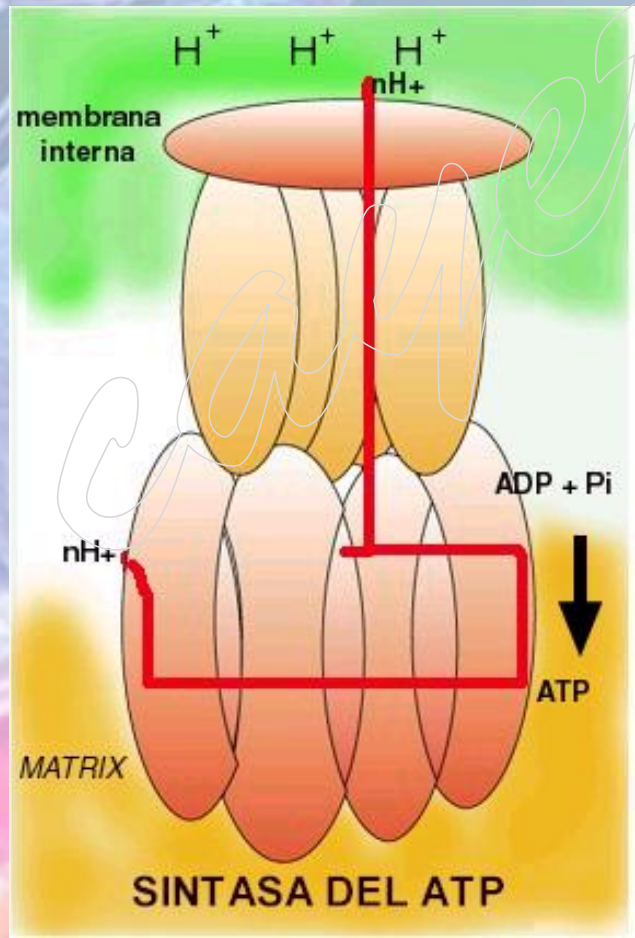




# GLUCOLISIS AEROBICA

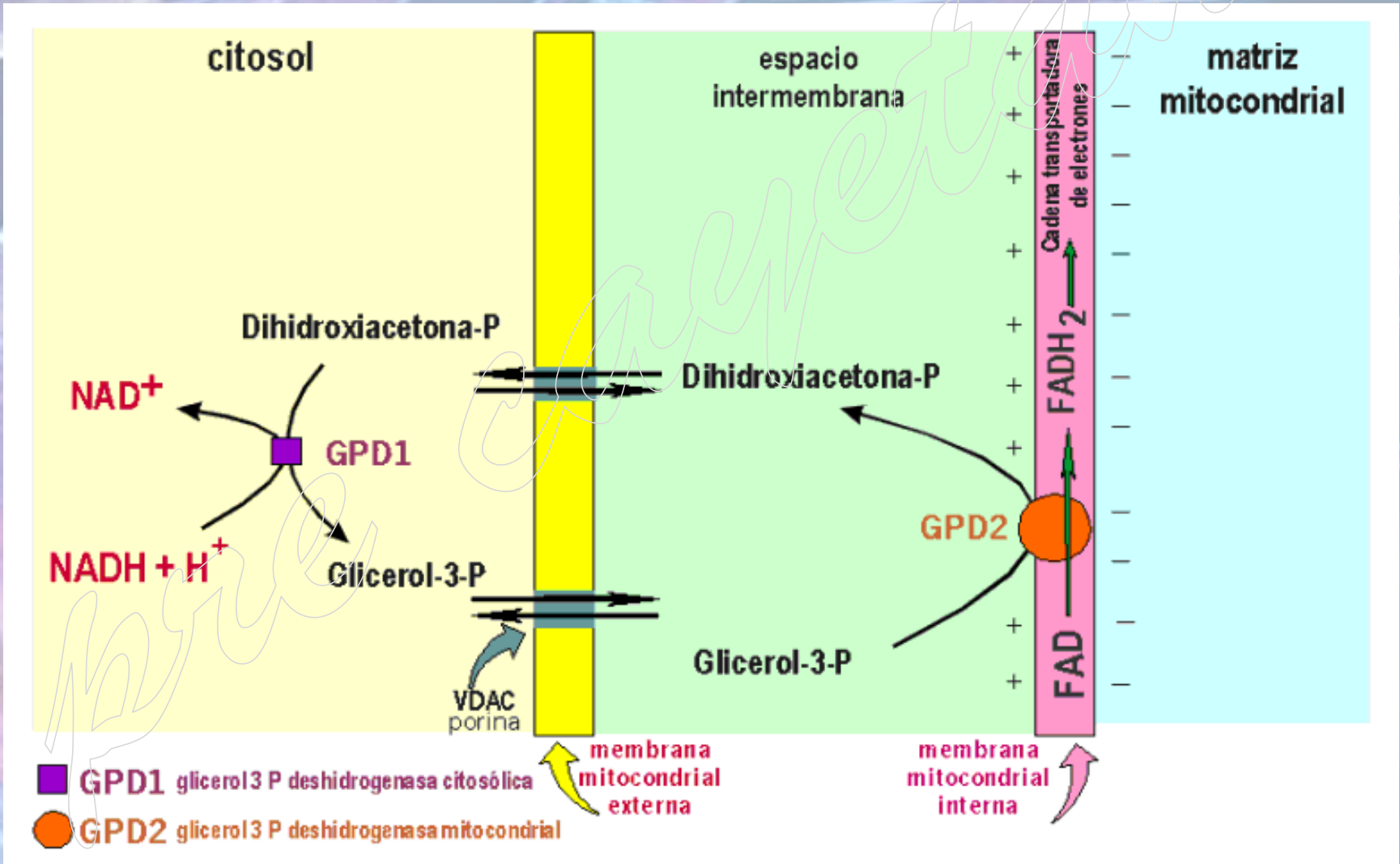


# **ATP Sintetasa**

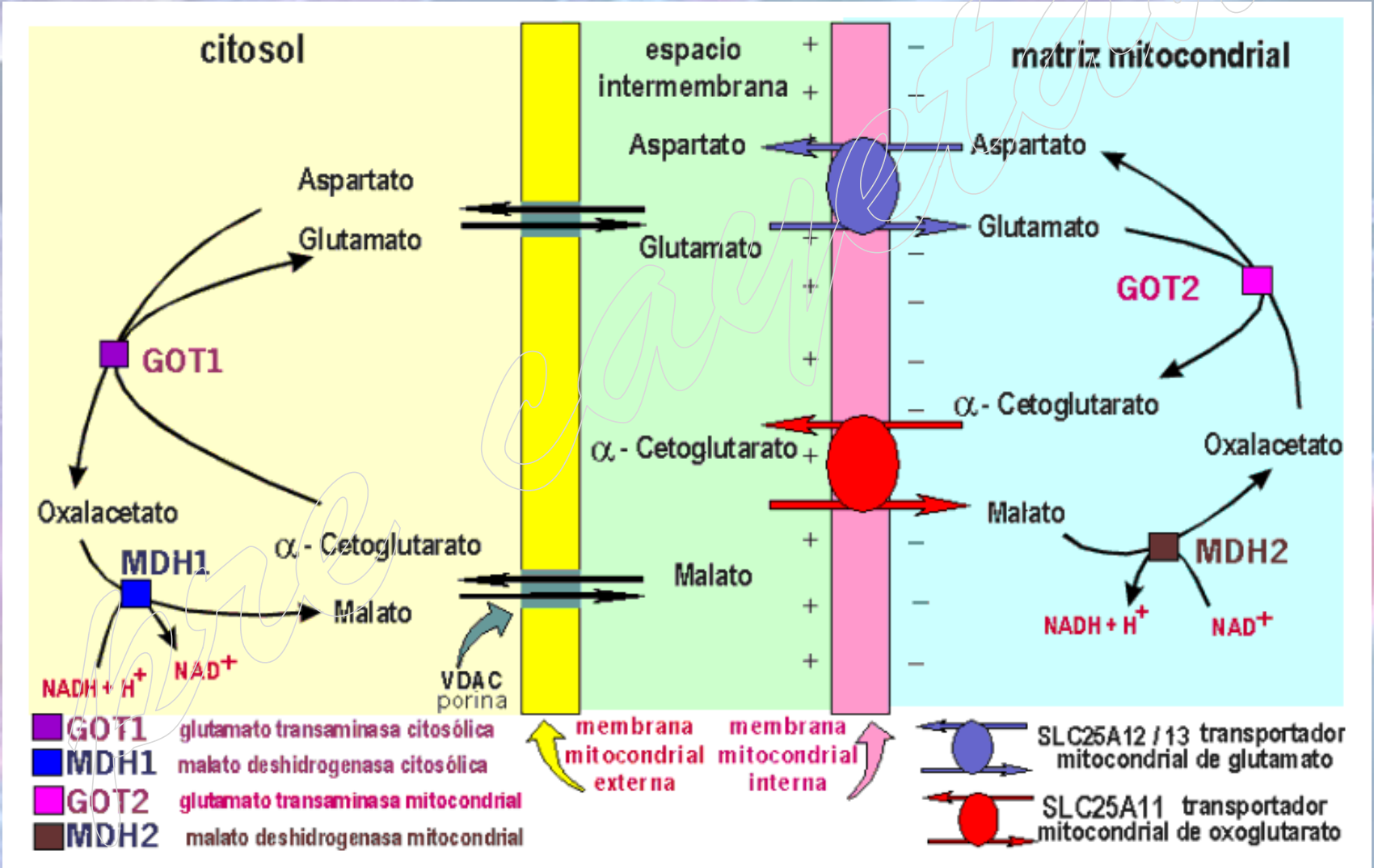




# Lanzadera Glicerol 3 Fosfato

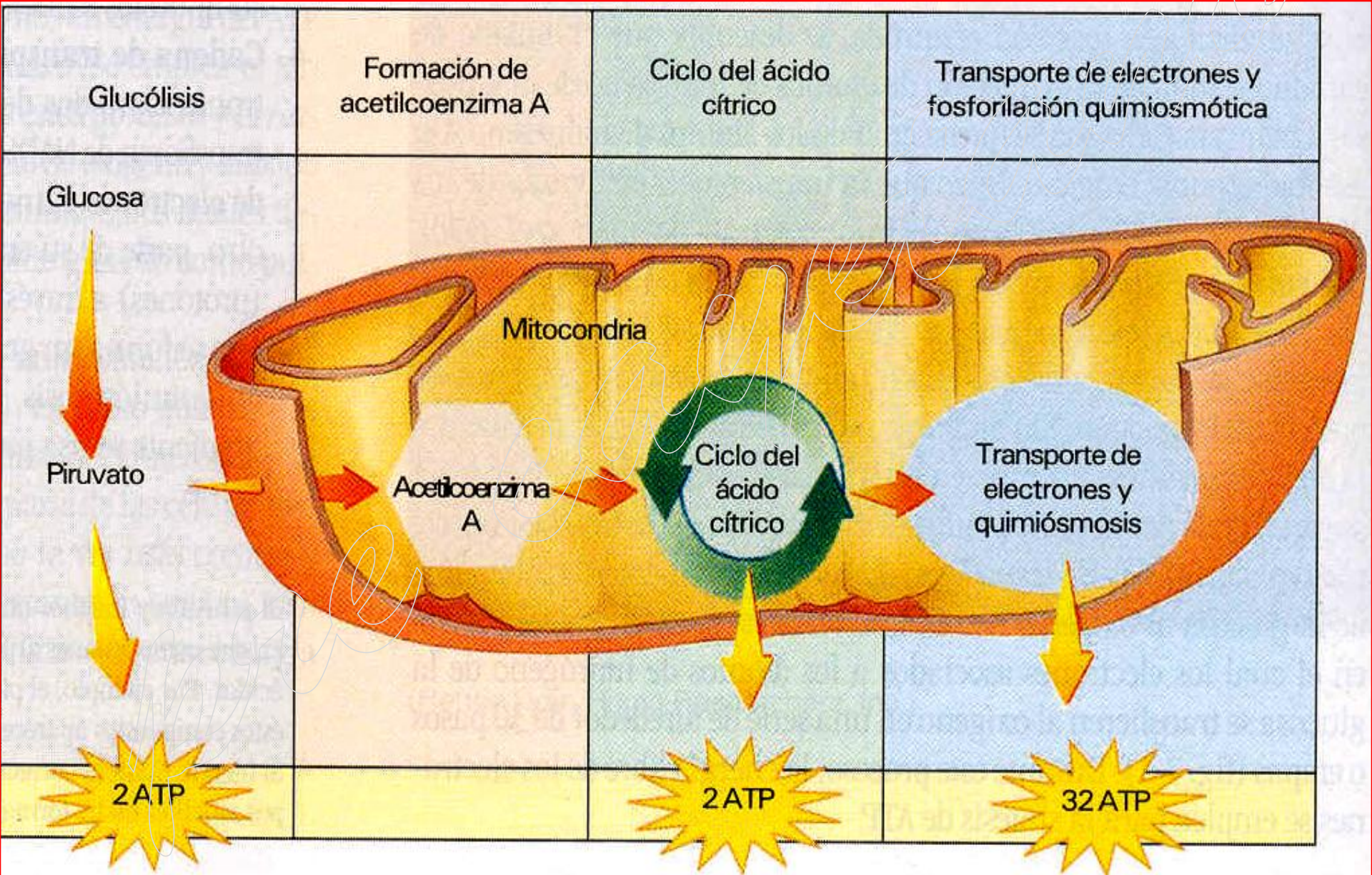


## Lanzadera Aspartato - Malato



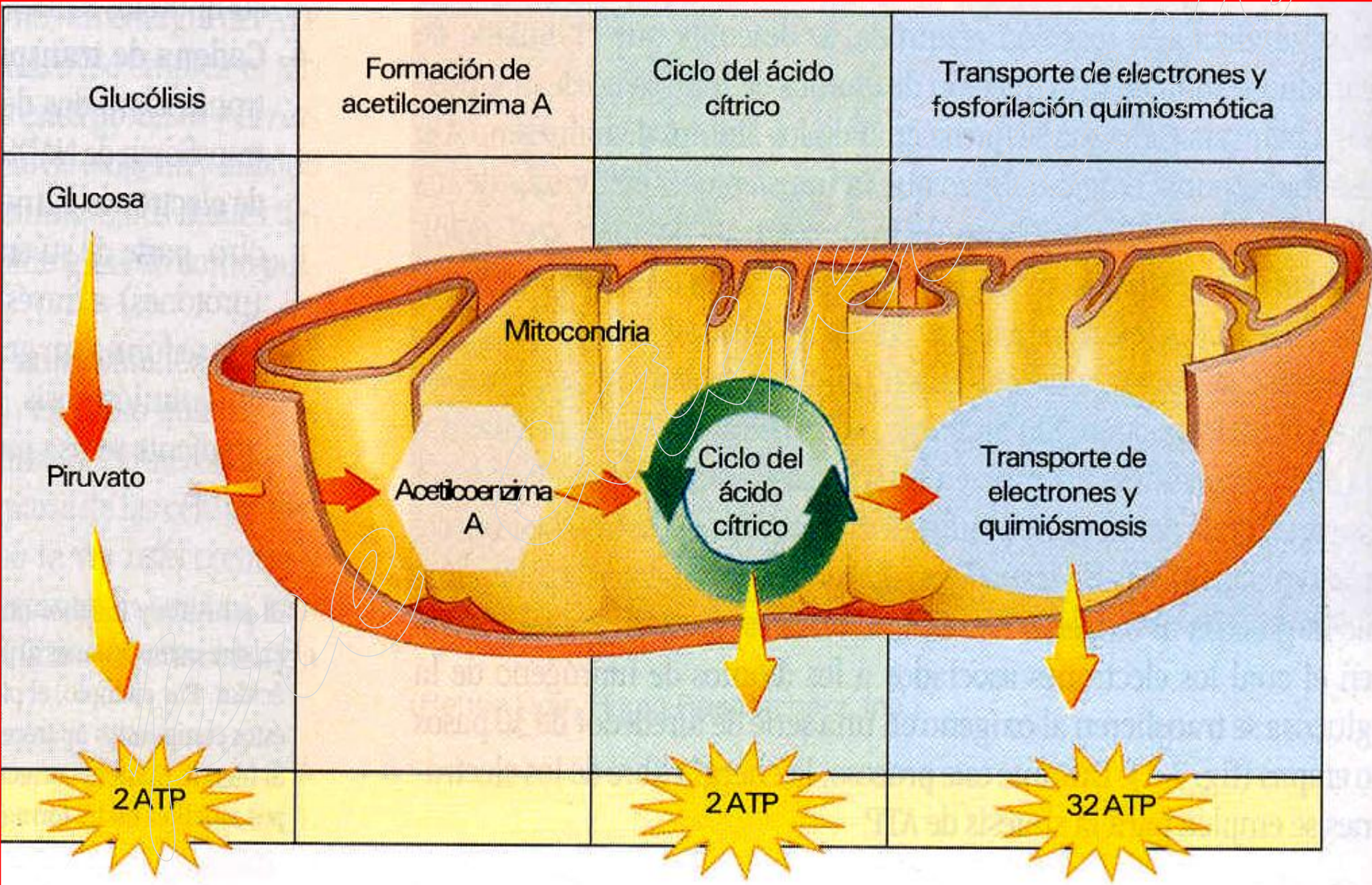


# GLUCOLISIS AEROBICA





# GLUCOLISIS AEROBICA





# GLUCOLISIS AEROBICA

## Glicólisis

**2ATP**  
**2NADH(citosólico)** **2**  
**4 o 6**

## Respiración celular

**Fase I → III : 2NADH x 3 ATP = 6 ATP**  
**Fase II → III : 6NADH x 3 ATP = 18 ATP**  
**→ III : 2 FADH<sub>2</sub> x 2 ATP = 4 ATP**  
**II : 2GTP ≡ 2 ATP**

**TOTAL DE ATP PRODUCIDOS POR GLUCOSA: 36 o 38**



# OXIDACION DE LIPIDOS

