

TCA cycle

Page No.

Date

• Krebs's cycle - named after Hans-Krebs

• TCA cycle.

• Series of reactions in mitochondrion that oxidise acetyl CoA and is linked to formation of ATP.

• Occur in most tissue but significantly in liver.

Sources and utilization of acetyl CoA

Sources: pyruvate

Fatty acids

Ketogenic

Aminoacids

→ acetyl CoA →

Utilization

oxidised to CO₂

Fatty acids

Ketone bodies

Cholesterol → steroid hormone

Reactions of TCA cycle

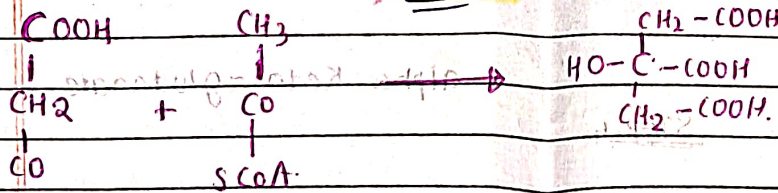
• reaction begins with the rxn between acetyl CoA and oxaloacetate

• acetyl CoA is oxidised releasing 2 mole of CO₂.

• oxaloacetate is req. only in small quantities and is also regenerated.

• Enzymes located in mitochondrial matrix or attached to inner mitochondrial membrane

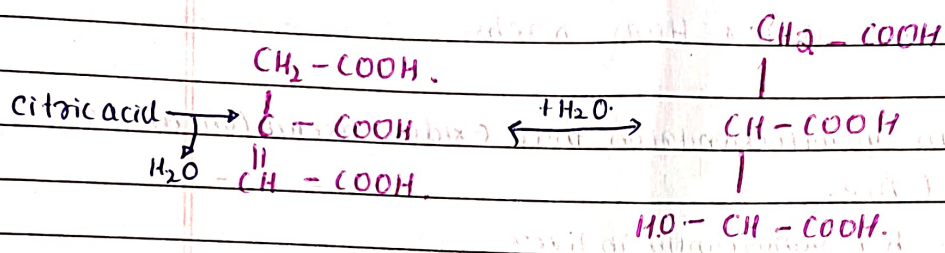
STEP-1



Enzyme: Citrate Synthase

irreversible step.

STEP 2: Two step process.



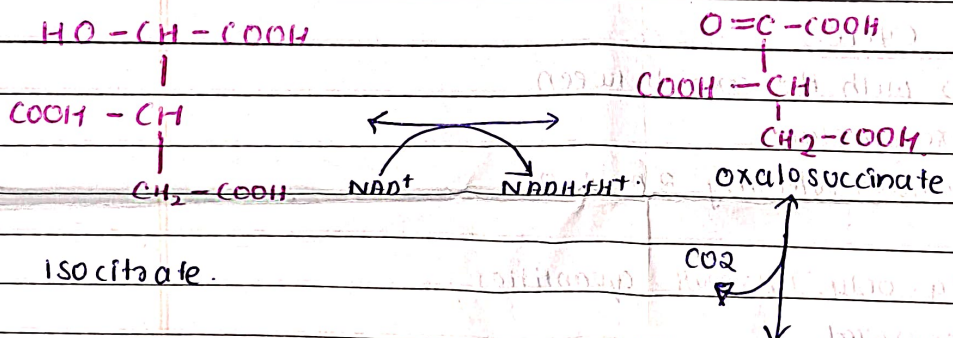
cis-aconitic acid.

iso citric acid.

Enzyme: Aconitase.

Reversible.

Step-3



Enzyme: isocitrate dehydrogenase

Energy producing step.

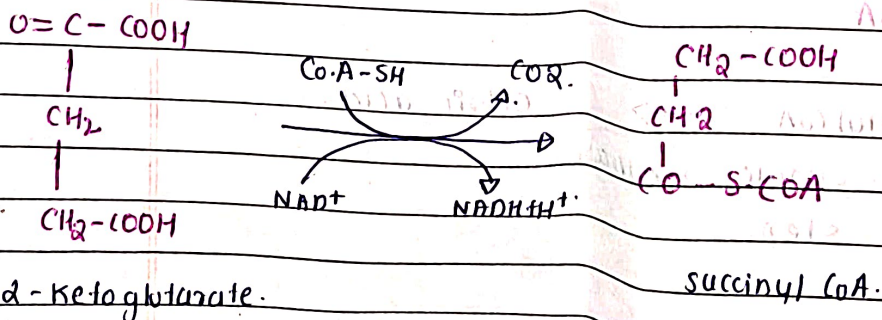
CO₂ released.

alpha keto-glutarate.

alpha keto-glutarate.

alpha keto-glutarate.

STEP-4



Enzyme: alpha-ketoglutarate dehydrogenase
energy producing step.

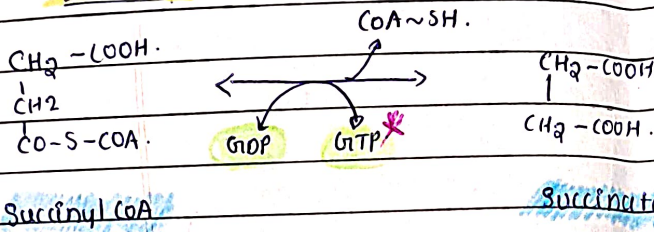
• d-KGDHase : Irreversible step.

Similar to PDH reaction.

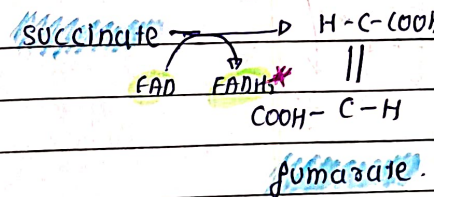
Multienzyme complex (contains 3 enzymes and 5 co-enzymes)

NADH and CO₂ released.

5th step.



6th step.



Enzyme: Succinate thiokinase.

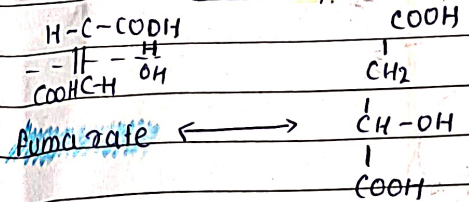
eg. of substrate level phosphorylation
* Energy producing step.

Enzyme: Succinate dehydrogenase.

* Energy producing step.

Substrate level phosphorylation:
energy from substrate is directly transferred to nucleoside diphosphate to form a triphosphate (ADP → ATP) without the intervention of ETC.

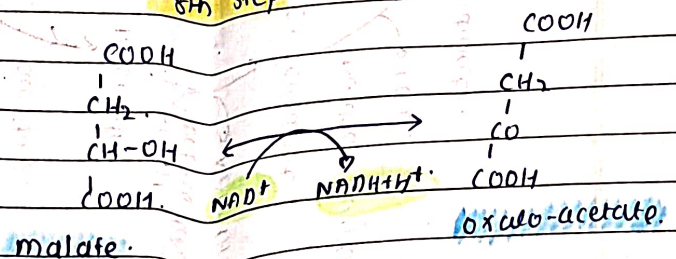
7th step.



• Enzymes catalyzing substrate level phosphorylation are:

- * Pyruvate Kinase
- * Succinate thiokinase.
- * Bisphospho glycerate Kinase.

8th step.



Enzyme: malate dehydrogenase

Energy producing step.

