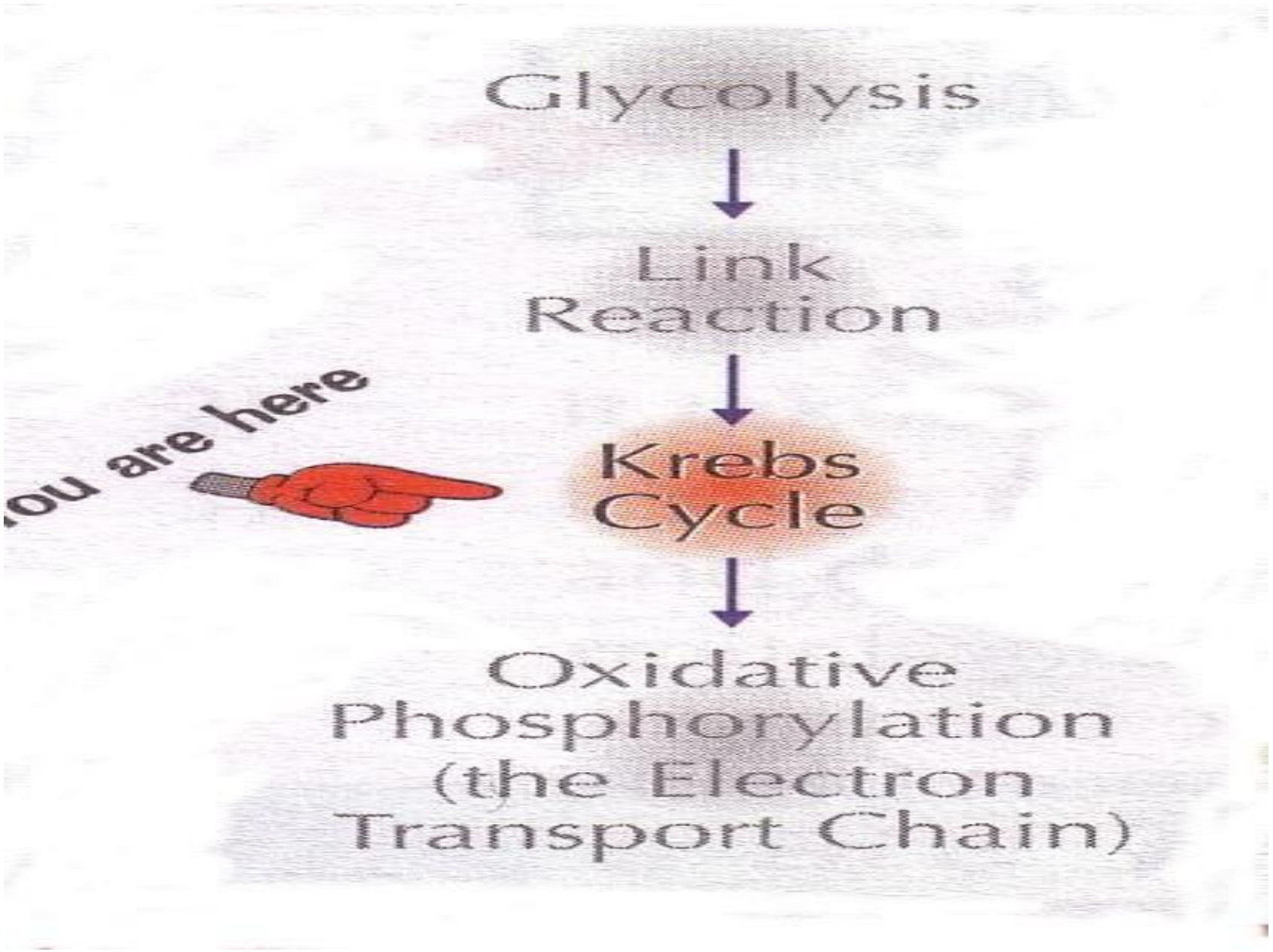
Unit-III Kreb's Cycle

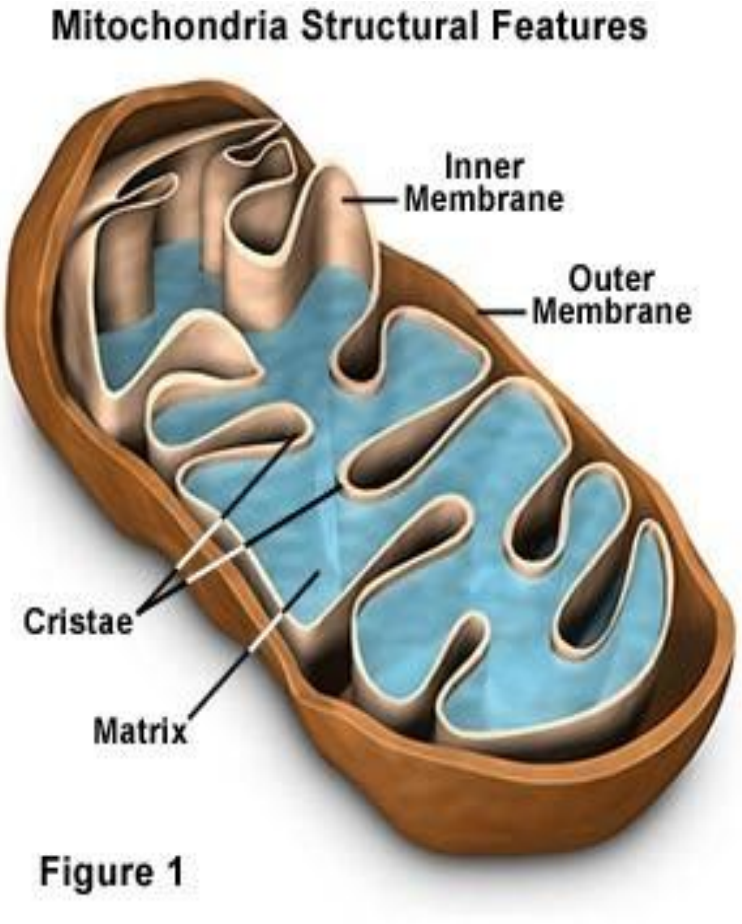
Prepared by

Ms. KEERTHI, M.Pharm,
Associate Professor, Department of Pharmaceutical Analysis,
Krishna Teja Pharmacy College,
Tirupati.

Subject: Pharmaceutical Biochemistry (B.Pharm I/II sem, 15R00203)


Glycolysis
Link Reaction
ou are here
Krebs Cycle
Oxidative Phosphorylation (the Electron Transport Chain)

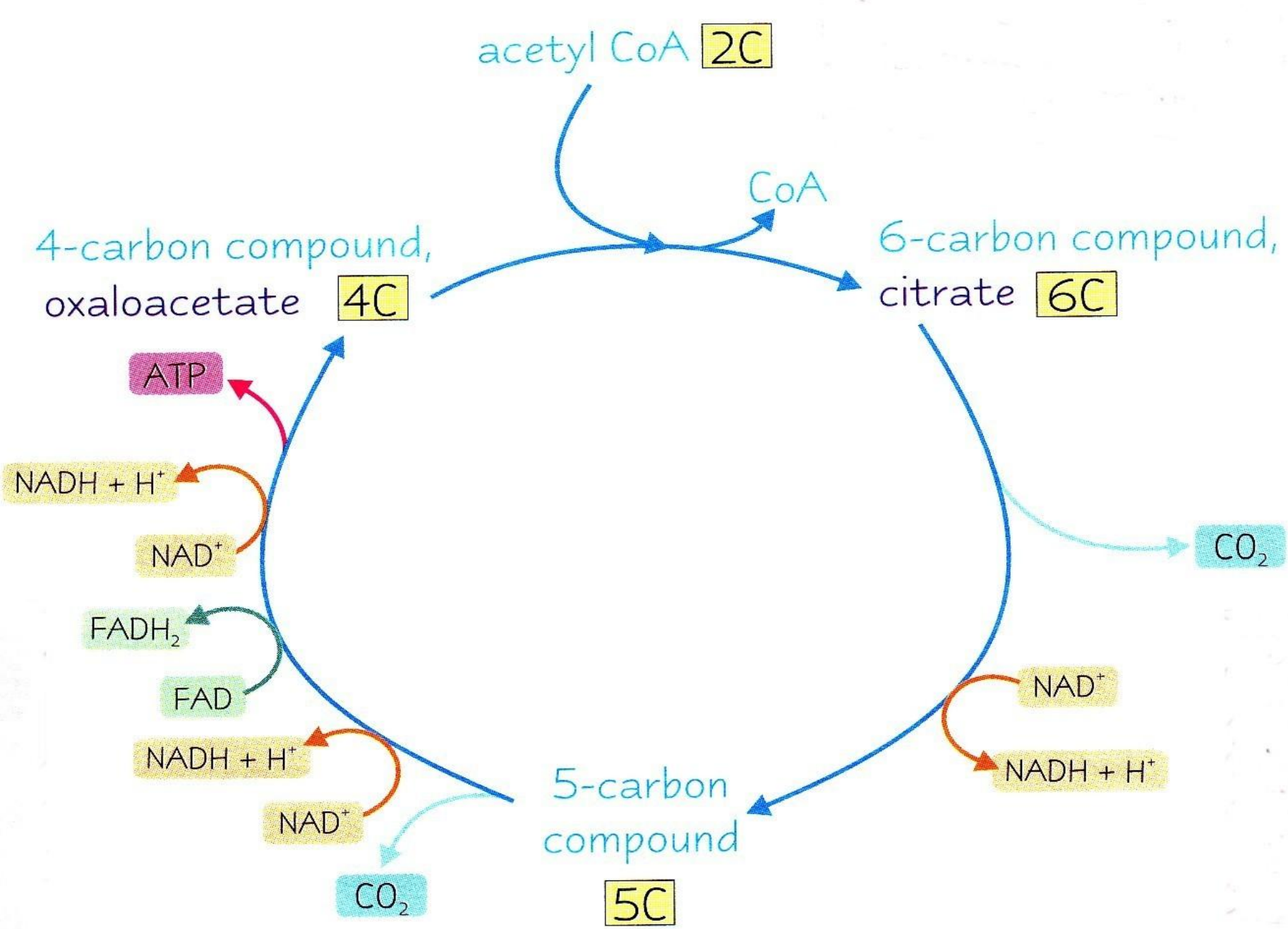
The **Krebs Cycle** is the **Third Stage** of Aerobic Respiration



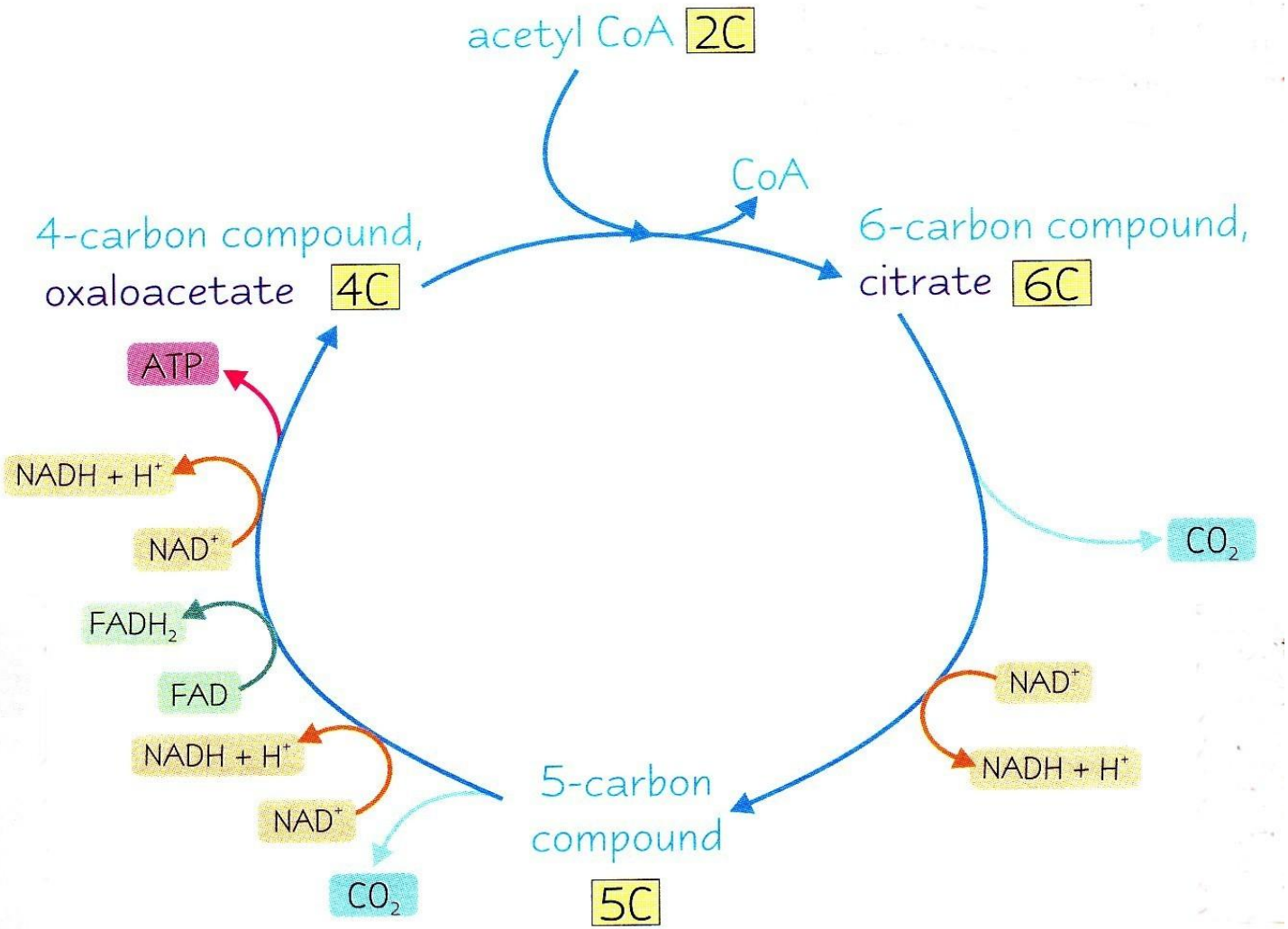
Takes place in the **matrix** of the mitochondria.

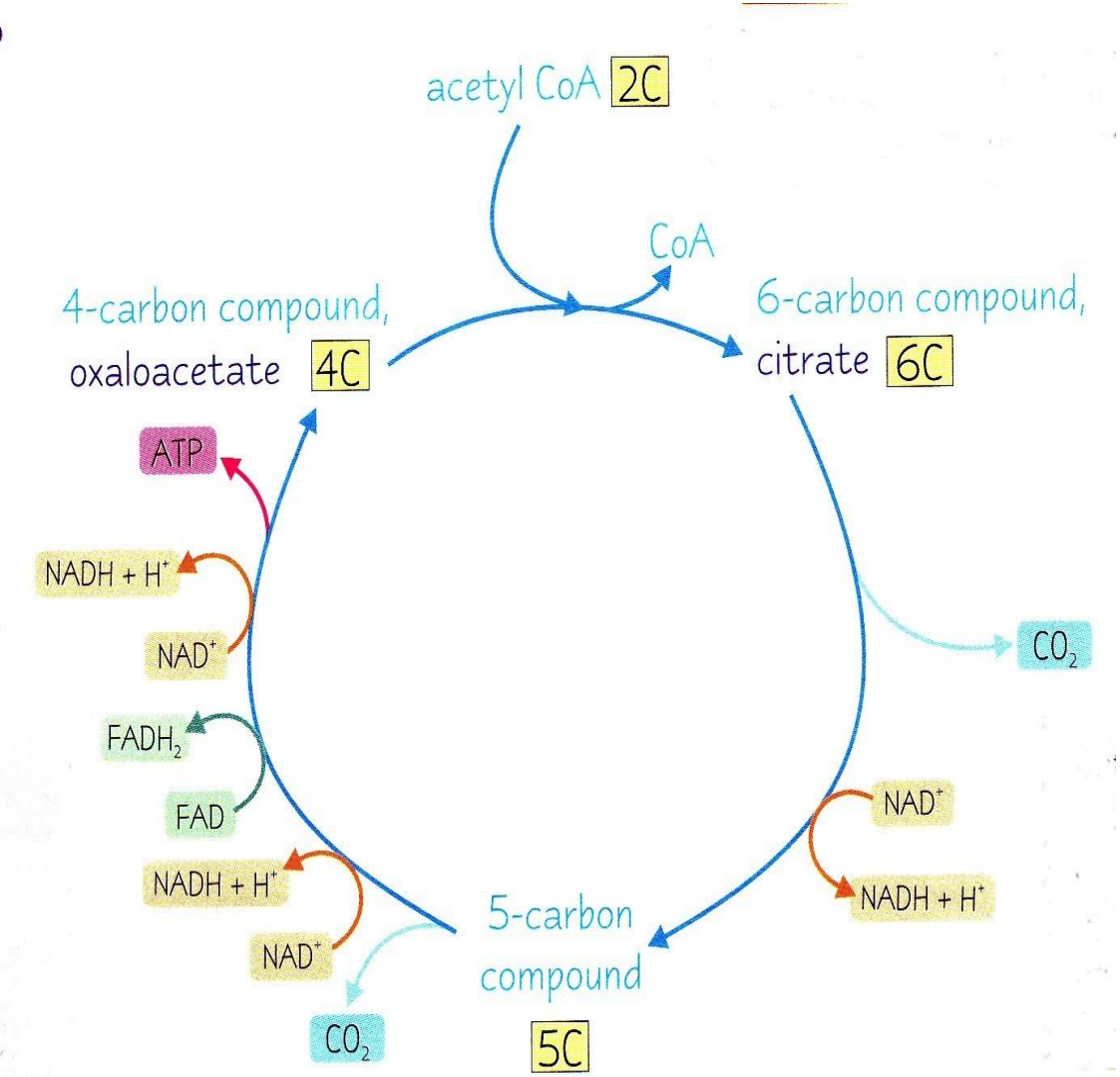
It happens once for every pyruvate molecule in glycolysis….

..and so it goes round twice for every glucose molecule that enters the respiration pathway.

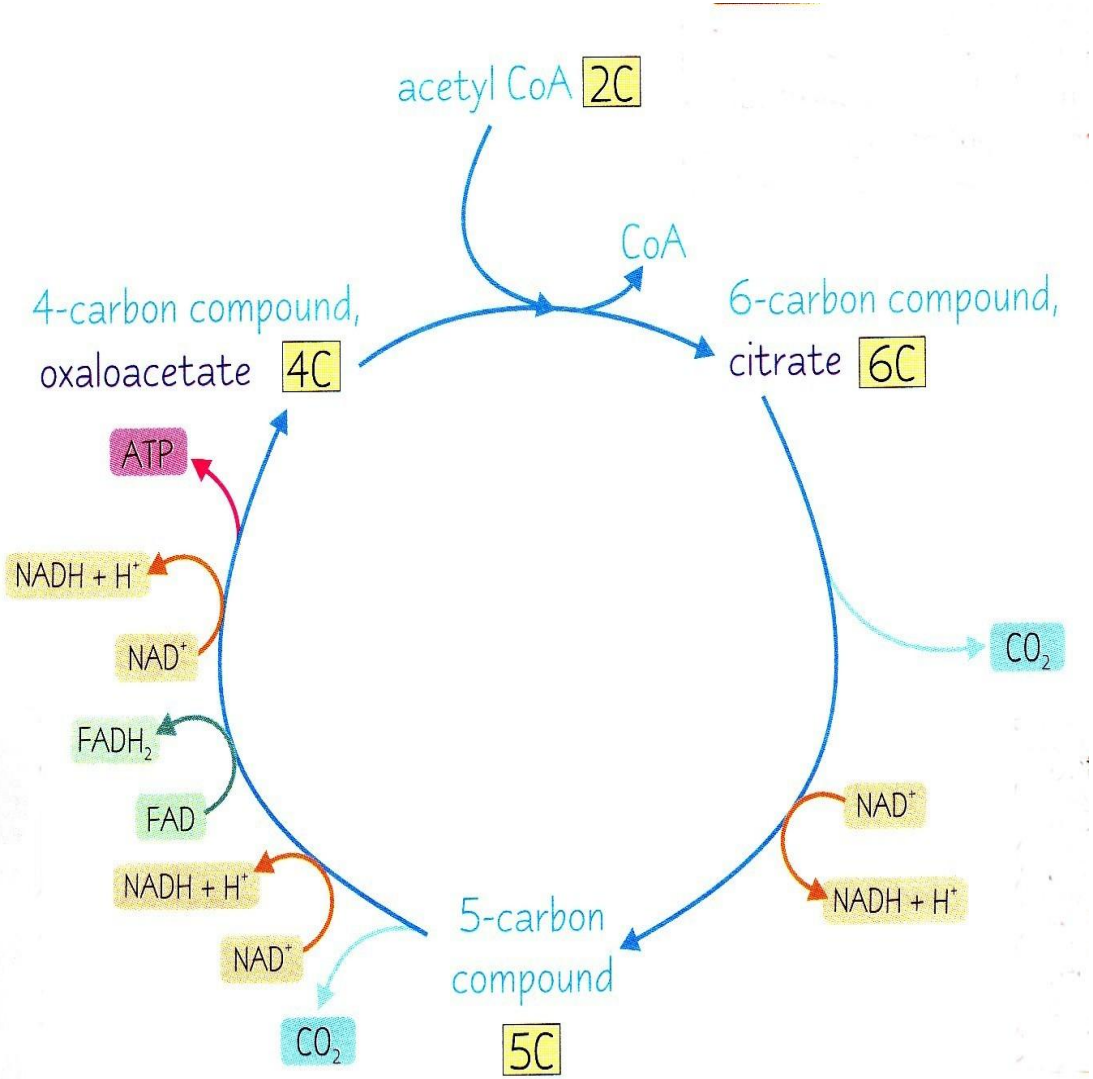

acetyl CoA 2C
CoA
4-carbon compound,
oxaloacetate 4C
6-carbon compound,
citrate 6C
ATP
NADH + H+
NAD+
FADH2
FAD
NADH + H+
NAD+
CO2
5-carbon
compound
5C
CO2
NAD+
NADH + H+

AcetylCoA (2C) from the link reaction combines with **oxaloacetate**(4C) to form citrate (6C). **CoA** is released back to the **link reaction** to be reused

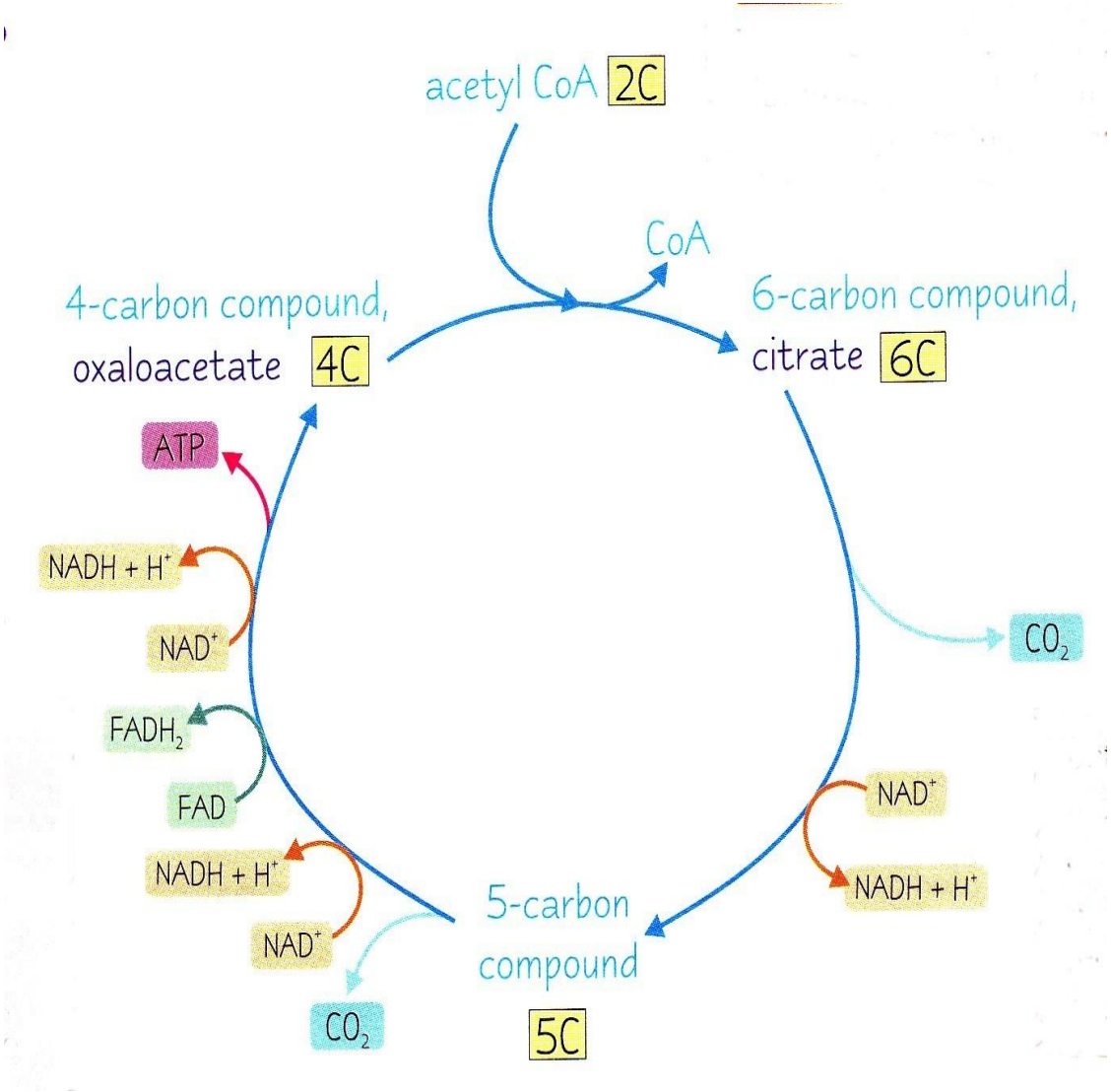




The **6-carbon citrate** is **decarboxylated** – loses **CO_2** – to give a **5-carbon molecule**

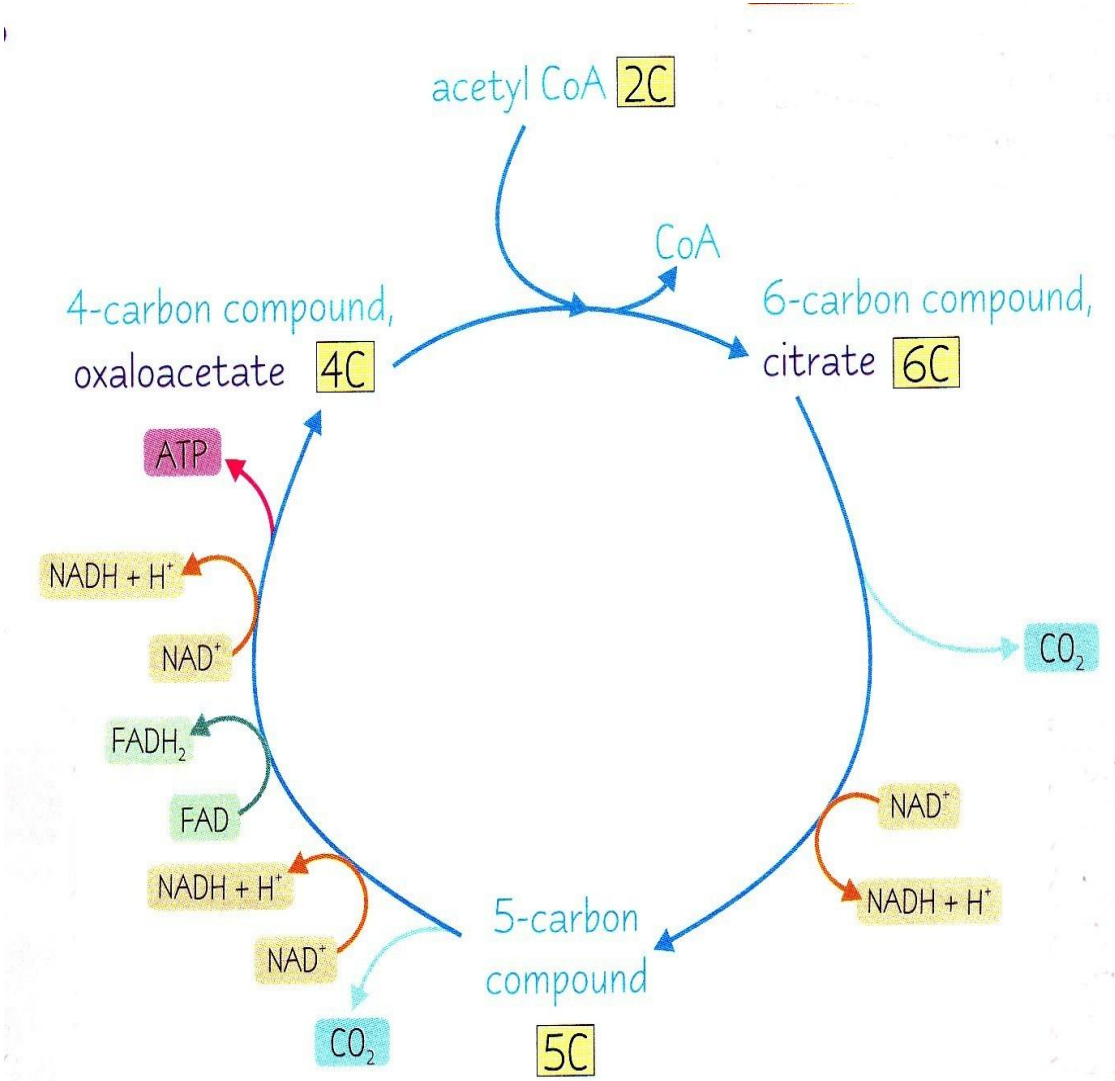


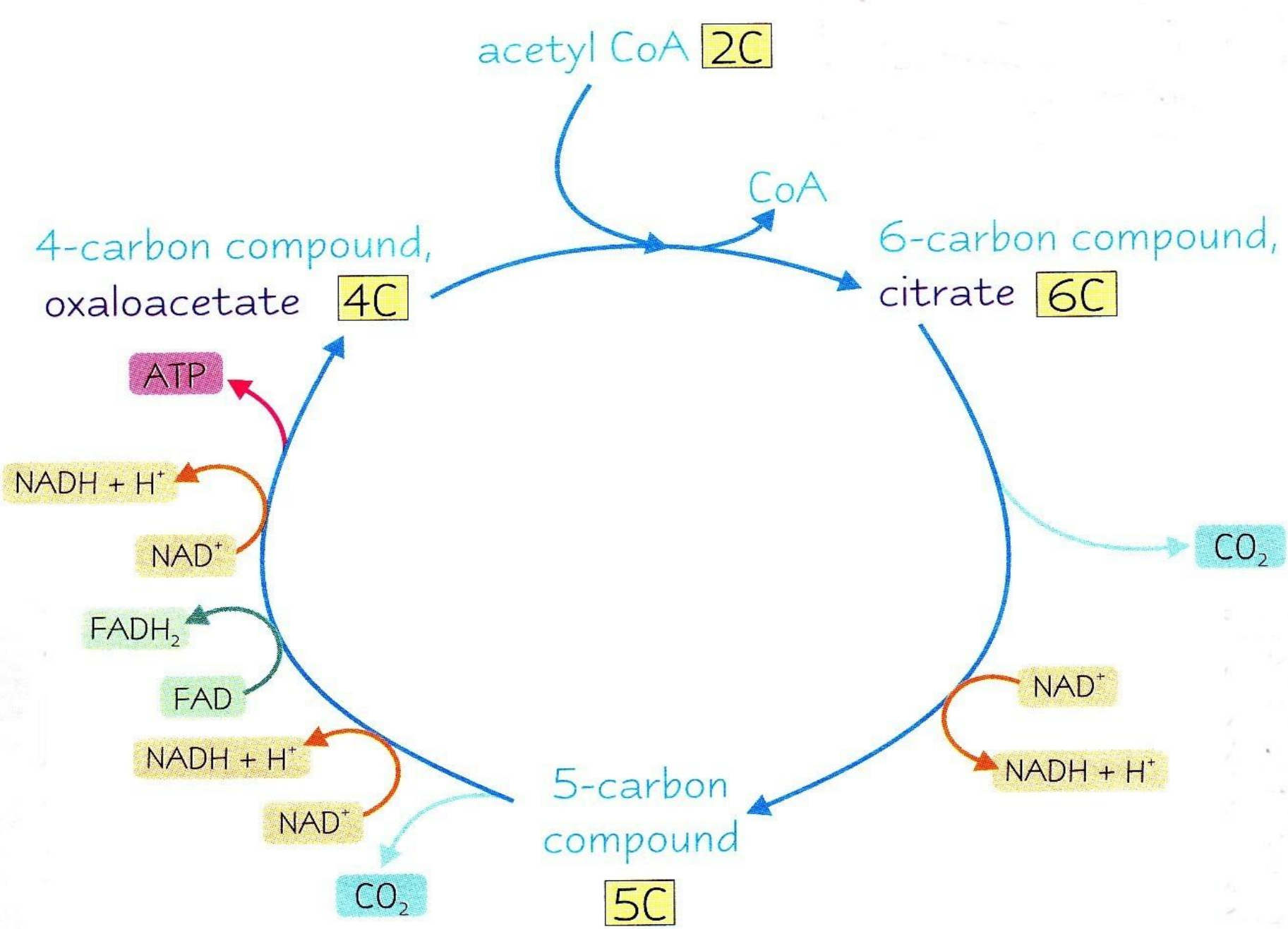
Both the citrate and the 5- carbon molecule formed from it are **dehydrogenated** (lose **hydrogen**) in the cycle to reduce the **coenzymes NAD** and **FAD**



Overall, 3 **reduced NAD+** and 1 **reduced FAD** are produced. These coenzymes not carry the **hydrogen** to the **electron transport chain** (etc)

The **5-carbon compound** is **decarboxylated** bringing you back to **4-carbon oxaloacetate**. **ATP** and **CO_2** are released.

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CO2
5-carbon
compound
5C
CO2
NAD+
NADH + H+

Products of the **Krebs Cycle** enter the **Final Stage** of **Aerobic Respiration**

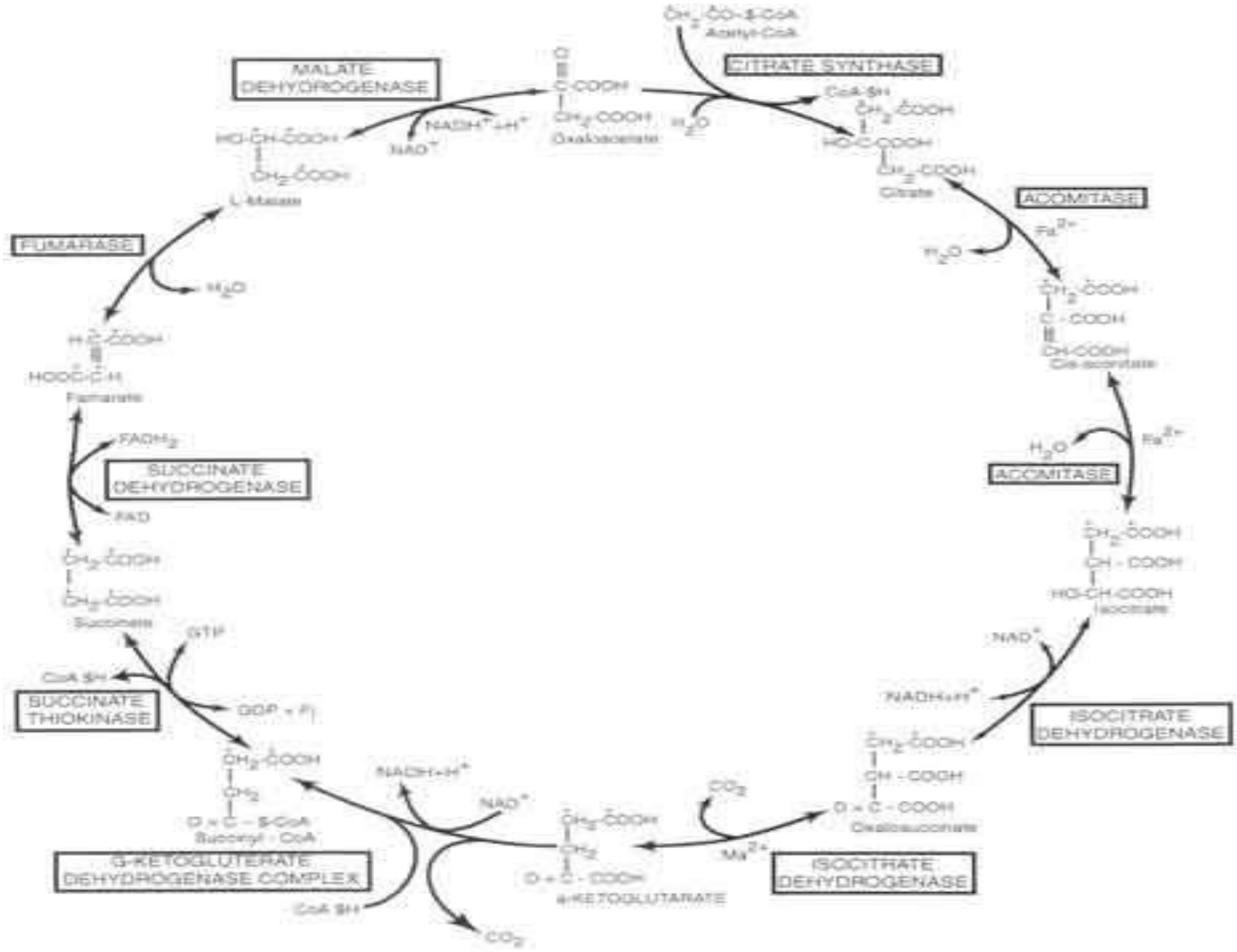
Some products are **reused,** some are **released** and others are used in the **final** stage, **oxidative phosphorylation**

- One **CoA** is reused in the next **link reaction.**
- **Oxaloacetate** is **regenerated** so it can be **reused** in the next **Krebs cycle**.

- Two **carbon dioxide** molecules are released as a **waste product** of respiration.
- One molecule of **ATP** is made per turn of the cycle – by **substrate level phosphorlyation.**

- **Three reduced NAD** and **one reduced FAD** coenzymes are made and enter the **e.t.c.**

Oxidative Phosphorylation happens via the **Electron Transport Chain.**


CITRATE SYNTHASE
Acetyl-CoA
Oxaloacetate
Citrate
ACONITASE
Cis-aconitate
Isocitrate
ISOCITRATE DEHYDROGENASE
Oxalosuccinate
ISOCITRATE DEHYDROGENASE
α-KETOGLUTARATE
α-KETOGLUTARATE DEHYDROGENASE COMPLEX
Succinyl - CoA
SUCCINATE THIOKINASE
Succinate
SUCCINATE DEHYDROGENASE
Fumarate
FUMARASE
L-Malate
MALATE DEHYDROGENASE