Question: kreb's cycle

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Answer:

. Condensation

- Acetyl CoA (2C) reacts with oxaloacetic acid (4C) to form citric acid (6C).
- The reaction takes place in the presence of citrate synthetase.
- A molecule of CoA is released during this reaction.

Isomerisation

- Citric acid is isomerised into isocitric acid in the presence of enzyme aconitase.

Second Oxidative Decarboxylation

- Isocitric acid undergoes oxidative decarboxylation in the presence of enzyme isocitrate dehydrogenase and Mn^{2+}ions to form an intermediate called oxalosuccinic acid.
- Oxalosuccinic acid is further converted into the 5-carbon α-ketoglutaric acid.

Third Oxidative Decarboxylation

- α-Ketoglutaric acid (5C) undergoes simultaneous dehydrogenation and decarboxylation to form the 4-carbon compound Succinyl CoA.
- The reaction takes place in the presence of α-ketoglutarate dehydrogenase complex.

Synthesis of ATP and GTP

- Succinyl CoA (4C) is converted into succinic acid (4C) in the presence of succinyl CoA synthetase thiokinase.
- GDP is phosphorylated to form GTP.

Dehydrogenation of Succinic Acid

- Succinic acid (4C) undergoes dehydrogenation and releases two hydrogen atoms to form fumaric acid (4C) in the presence of succinic dehydrogenase.
- The hydrogen atoms are accepted by FAD and it is reduced to $FADH_2$.

Hydration

- A molecule of water is added to fumaric acid (4C) to form malic acid (4C).
- The reaction takes place in the presence of fumarase.

Dehydrogenation

- Malic acid (4C) releases two hydrogen atoms to form oxaloacetic acid (4C) in the presence of malic dehydrogenase.
- The released hydrogen atoms are accepted by NAD^+ and it is reduced to $NADH + H^+$.

Summary Equation for the Krebs Cycle

- During the Krebs cycle, the following molecules are synthesised:
  - 8 molecules of $NADH_2$
  - 2 molecules of FAH_2
  - 2 molecules of ATP (GTP)