

Cell Metabolism

- Cell metabolism
 - All chemical reactions that occur in a cell
 - Organized into metabolic pathways-specific order
 - Beginning reactants \longrightarrow End products
 - Each reaction in the process requires a specific enzyme that speeds up the reaction

- Two Types of Enzymatic Action
 - Degradation – enzymes break down substrates into products
 - Synthesis – enzymes combine substrates into products
 - Enzymes are named after their substrates & end in “ase”
 - Enzymes have a particular place called an “active site” where the substrates react, the shape of the active site determines the enzymes specific job.
 - Cofactors – components required by enzymes to assist in reactions
 - Inorganic – copper, zinc, iron
 - Organic – coenzymes – non-protein molecules, often vitamins

Cellular Respiration

Aerobic Respiration

Requires oxygen

Three sub-pathways for complete cell respiration

Glycolysis

- Occurs in cytoplasm
- Breakdown of glucose molecule in two pyruvate (pyruvic acid) molecules
- 2 hydrogen added to NAD → NADH
- 2 ATP formed

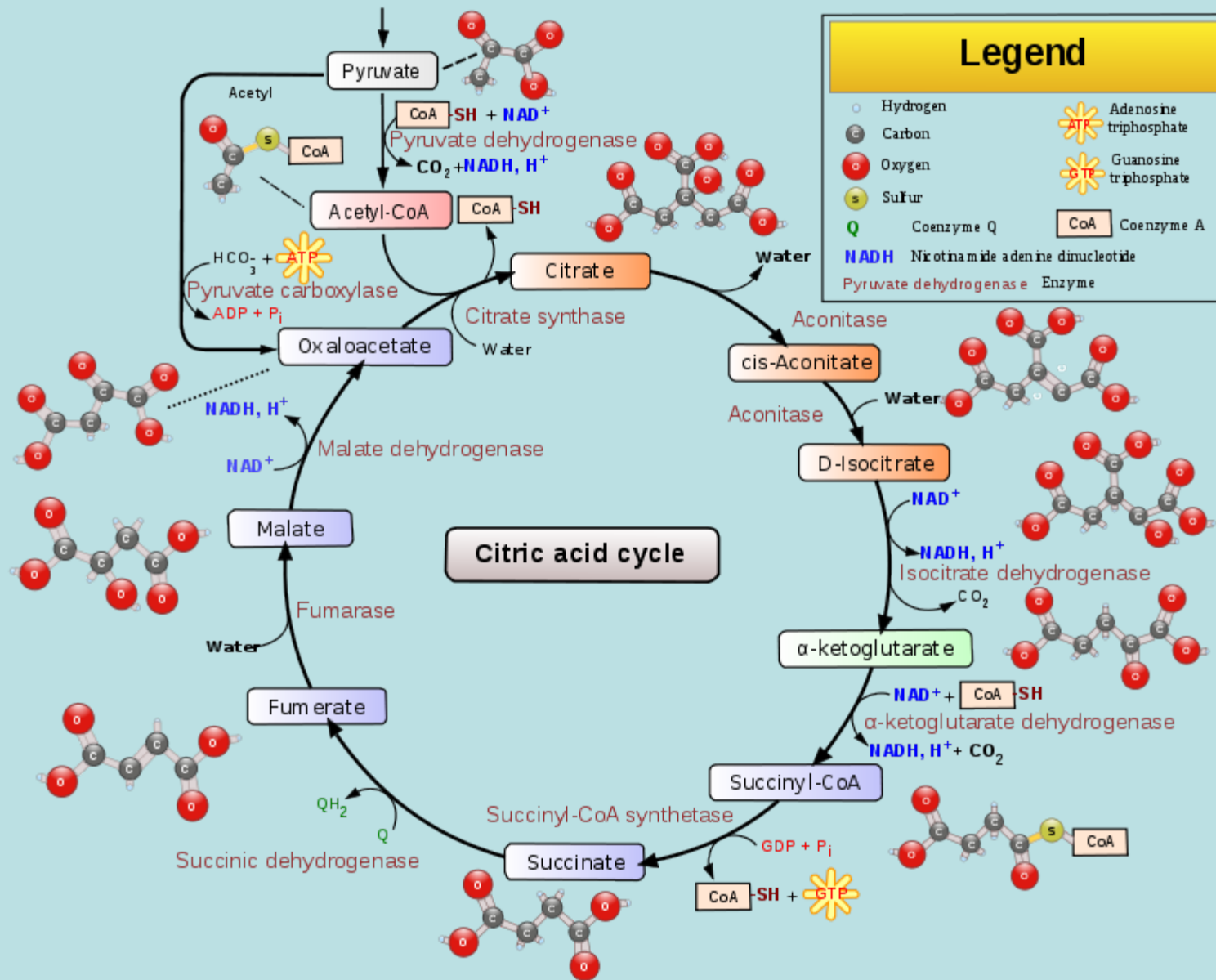
- <http://www.science.smith.edu/departments/Biology/Bio231/glycolysis.html>

Transition Reaction

- Occurs in matrix of mitochondria
- Transition reaction
 - Pyruvate \longrightarrow 2 carbon acetyl group
 - 2 CO₂ are released
 - H⁺ atoms are removed

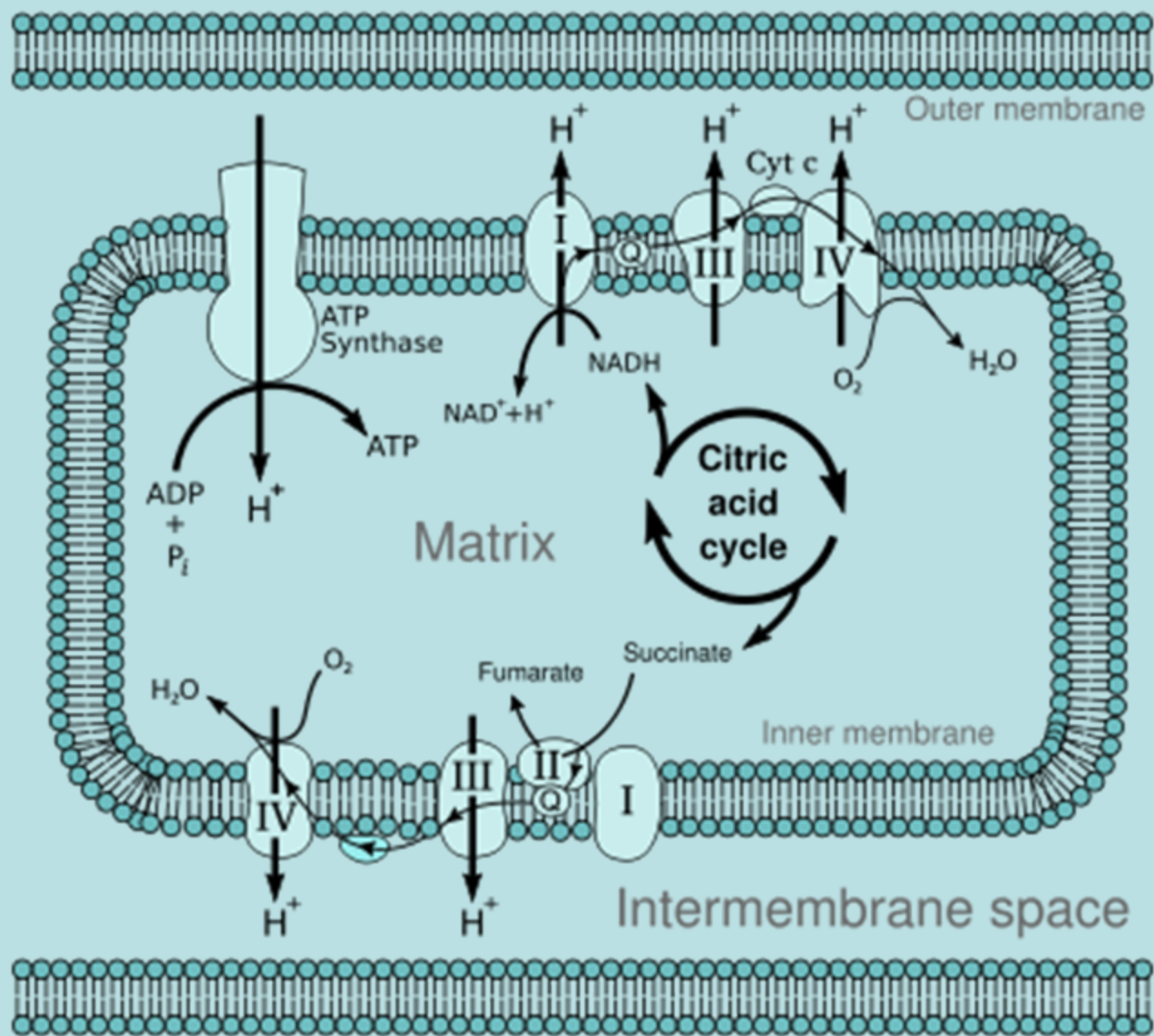
Krebs Cycle

- Cycle twice (2 carbon acetyl groups)
 - Produces 2 CO₂
 - Produce 2 ATP
 - Hydrogen added to NAD → NADH₂



Electron Transport

- Occurs in the cristae of the mitochondria
- Requires NADH₂ and O₂
- Electrons from hydrogen are passed down the molecule are chain to combine with O₂ and give off water.
- The passage of the electron's release energy to form 32 ATP molecules!!!!!!!



Anaerobic Respiration

- Also known as Fermentation
- No O_2 is used
- Only glycolysis occurs
- 2ATP
- Toxic- lactic acid – cramping, fatigue, sore
- Produces alcohol in plants