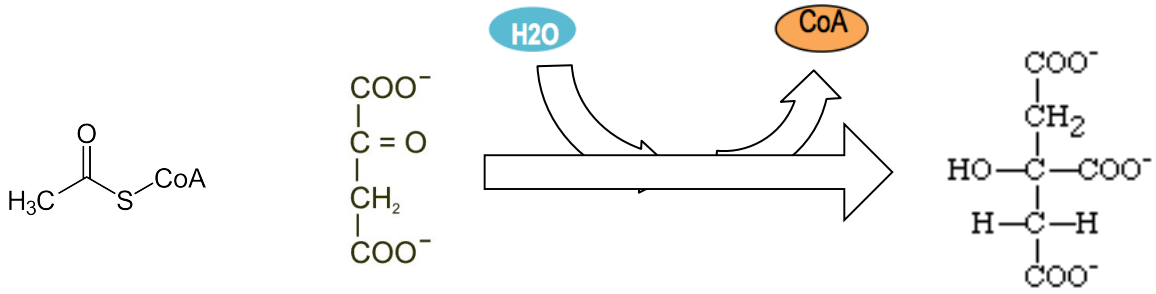
CONCEPT: CITRIC ACID CYCLE

1. Citrate synthase ($\Delta G'^{\circ}$ = -32 kJ/mol) – acetyl-CoA + oxaloacetate → citrate

□ Water is consumed in the reaction, and CoA is released



2. Aconitase ($\Delta G'^{\circ}$ = 13 kJ/mol) – citrate → *cis*-aconitate (enzymatic intermediate) → isocitrate

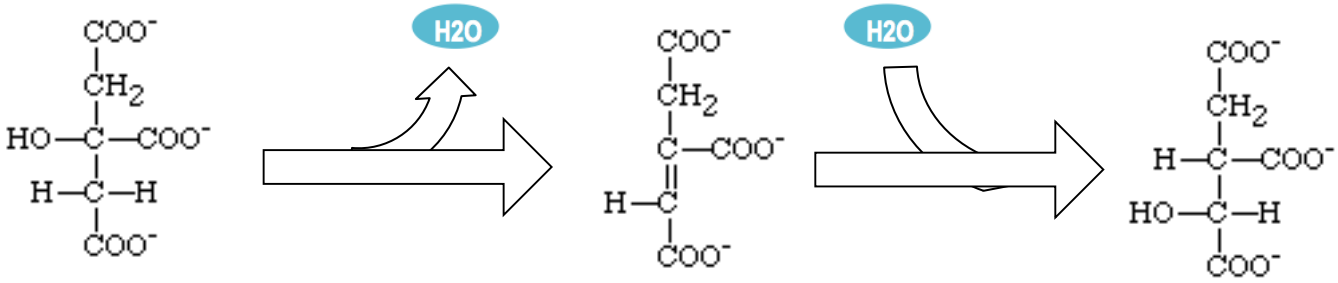
□ Removes water, then adds it back in

□ Citrate is prochiral, meaning it's not chiral, but acts chiral because aconitase binds citrate in one orientation

□ Fe-S complex held in active site by cysteine residues

□ It is an iron response regulatory molecule; changes shape due to lack of iron, and can then bind RNA

- Ferritin is produced when iron is high in blood, transferrin is produced when iron is low in blood



3. Isocitrate dehydrogenase ($\Delta G'^{\circ}$ = -21 kJ/mol) – isocitrate → α-ketoglutarate

□ Generates NADH and releases CO_2

□ Oxidative decarboxylase that uses NAD^+ or $NADP^+$ as the electron acceptor, and Mn^{2+} as a cofactor

- Does not use TPP, lipoate, FAD, CoA like pyruvate dehydrogenase or α-ketoglutarate dehydrogenase