(29) **Today**

Chap 16.1: Pyruvate Dehydrogenase Complex and
Chap 16.2: The Citric Acid Cycle

Next Class

Test 3

(30) **Second Class from Today**

Chap 16.2: The Citric Acid Cycle

Third Class from Today (31)

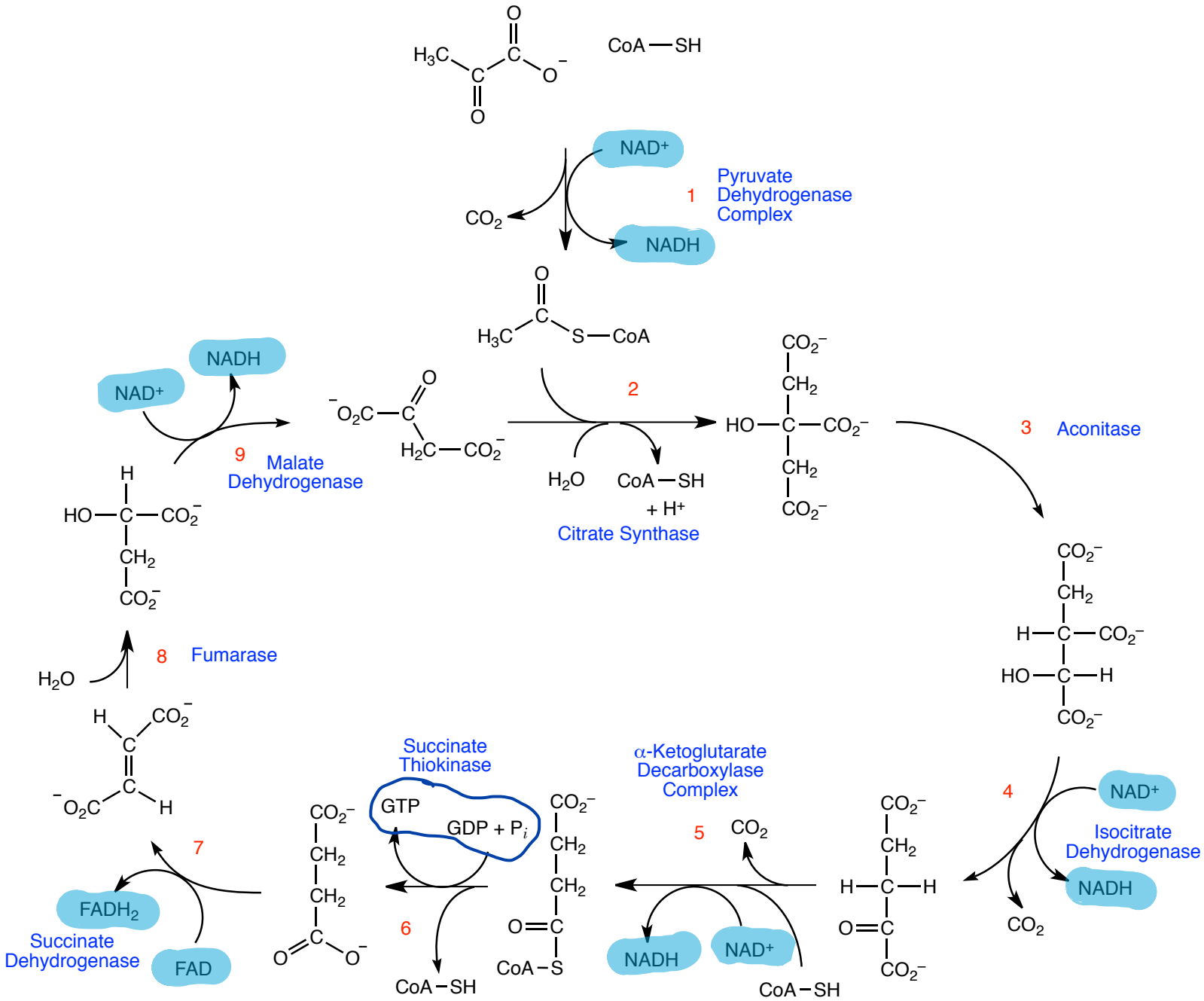
Chap 16.2: The Citric Acid Cycle

Test 3 on Carbohydrates and Glycolysis on Wednesday, April 23.

Review Tuesday, April 22 from 7:30 to 9:00.

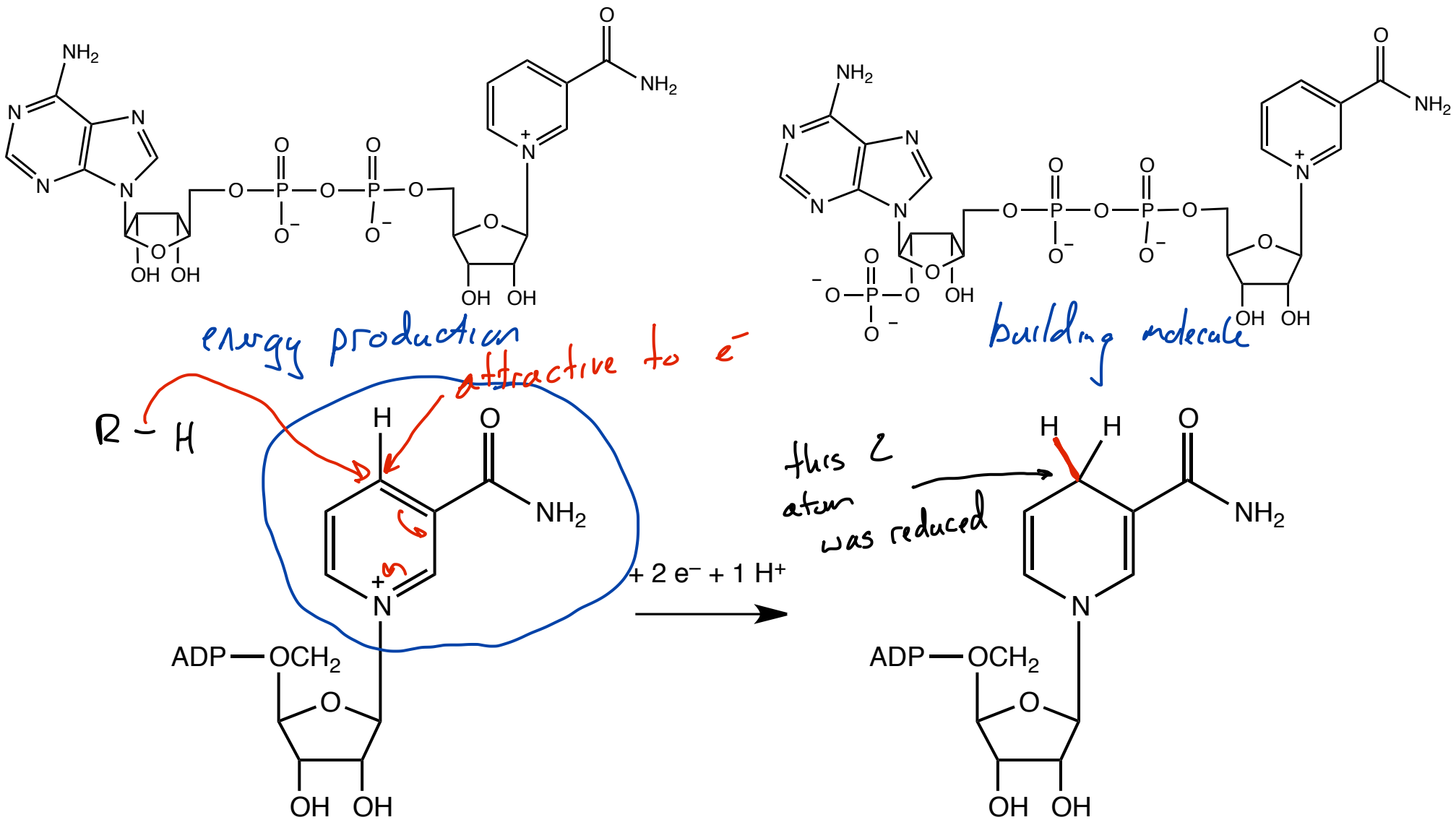
The Citric Acid Cycle

Section 16.1, 16.2



NAD^+ and FAD

Section 16.1, 16.2



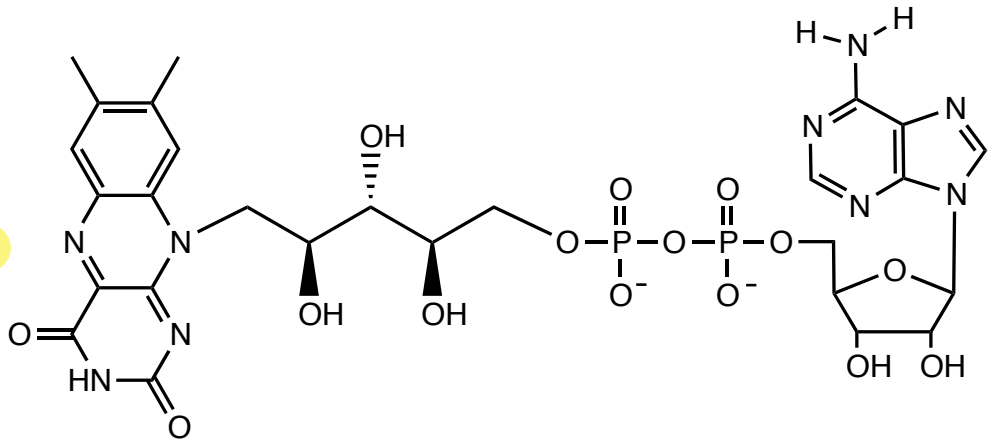
Oxidation numbers

$N_1 = -1 + -1 + -1 = -3$

$C_1 = +1 + 1 + 0 + 0 = +2$

$C_2 = 0 + 1 + 1 + 1 = +3$

$N_2 = -1 + -1 + -1 = -3$

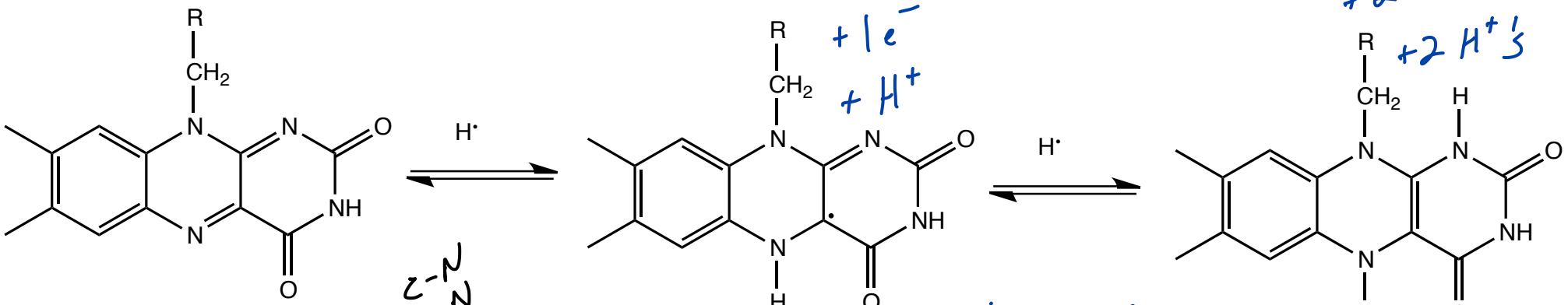


$N_1 = -1 + -1 + -1 = -3$

$C_1 = +1 + 0 + 0 + 0 = +1$

$C_2 = +1 + 0 + 0 + 1 = +2$

$N_2 = -1 + -1 + -1 = -3$

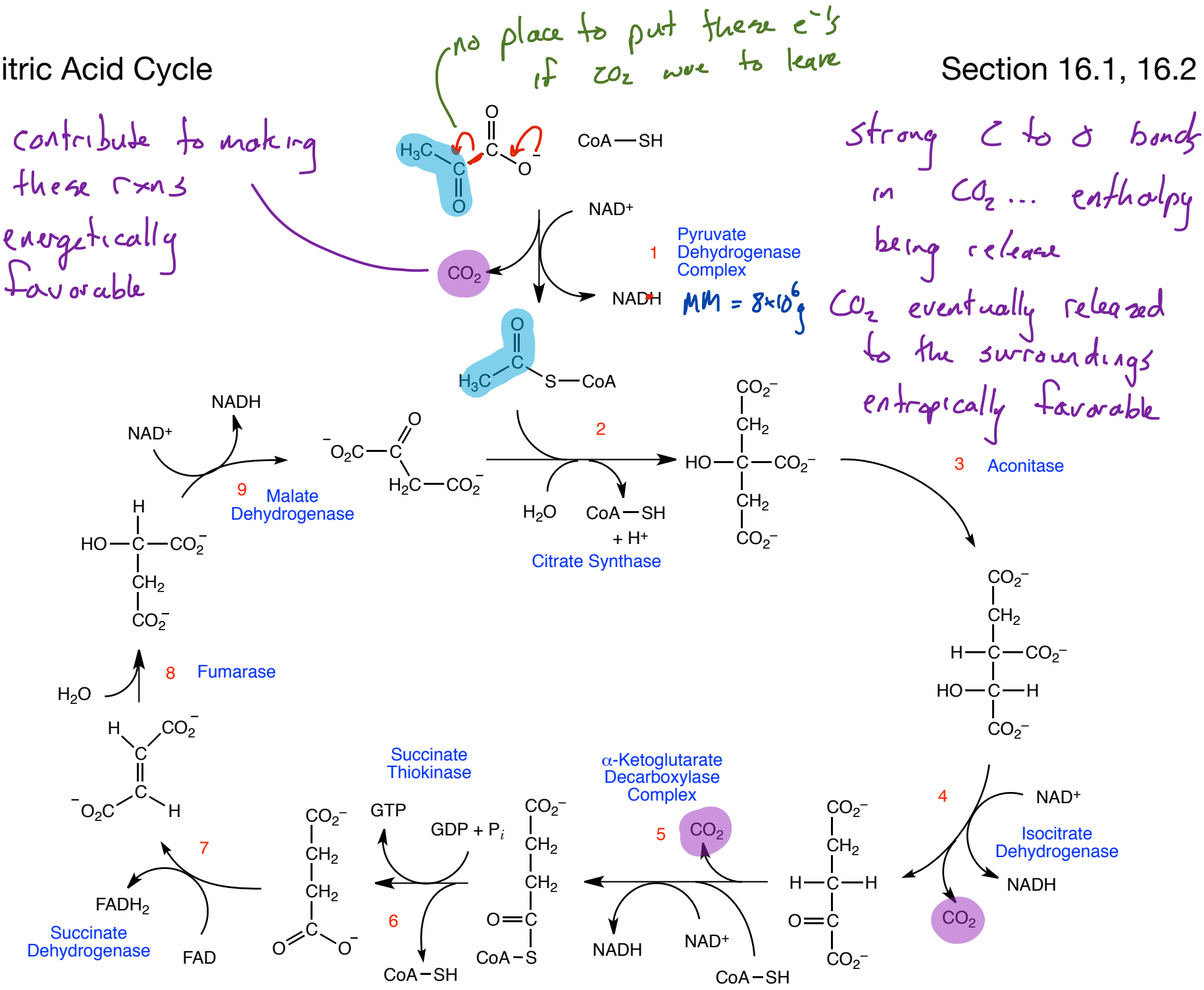


can pick up 1 e⁻ at a time

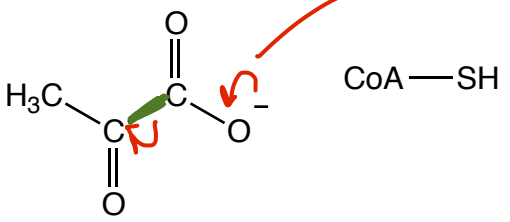
oxidized state

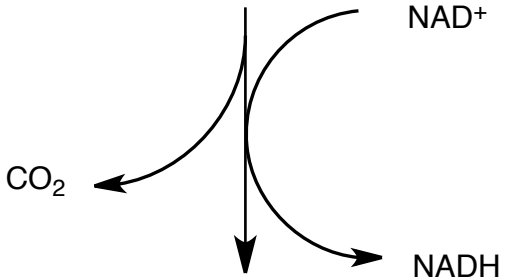
reduced state

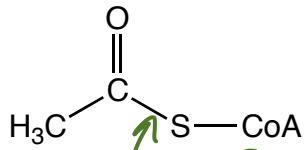
can pick up 2 e⁻'s at a time


no place to put these e⁻'s if CO2 were to leave
contribute to making these rxns energetically favorable
strong C to O bonds in CO2 ... enthalpy being released
CO2 eventually released to the surroundings entropically favorable
MM = 8×10⁶ g
CoA—SH
NAD+
NADH
1 Pyruvate Dehydrogenase Complex
2
Citrate Synthase
3 Aconitase
4
Isocitrate Dehydrogenase
5
α-Ketoglutarate Decarboxylase Complex
6
Succinate Thiokinase
GTP
GDP + Pi
7
Succinate Dehydrogenase
FADH2
FAD
8 Fumarase
9 Malate Dehydrogenase
H2O
CO2

too hard to do without help







relatively weak bond

coenzyme A

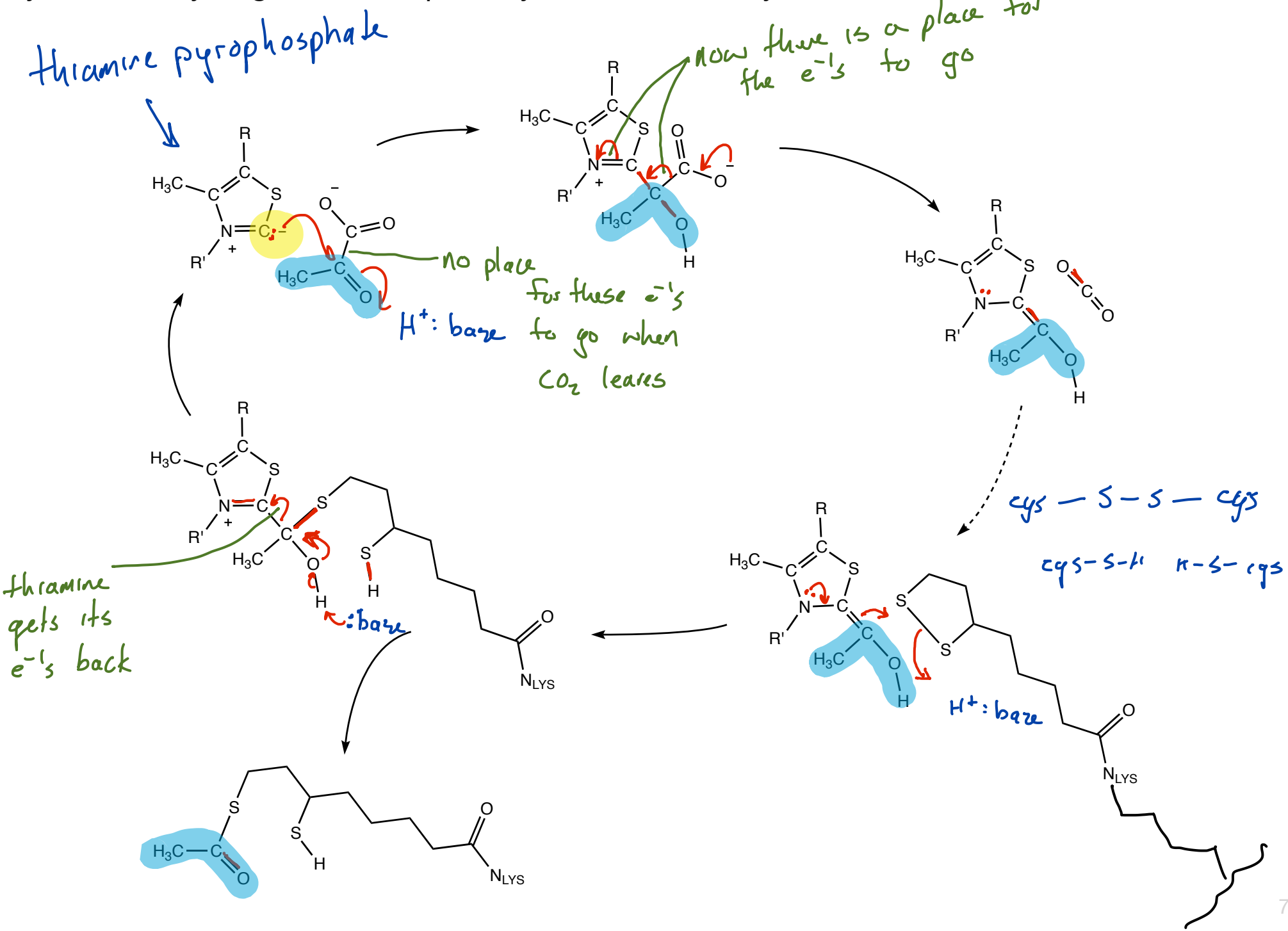
PDC has three jobs to do

- make it possible to break C=O 2 to $CO_2^{\ominus}$ C bond
- transfer those e^-'s to $NAD^{\oplus}$
- make C=O 2 more reactive

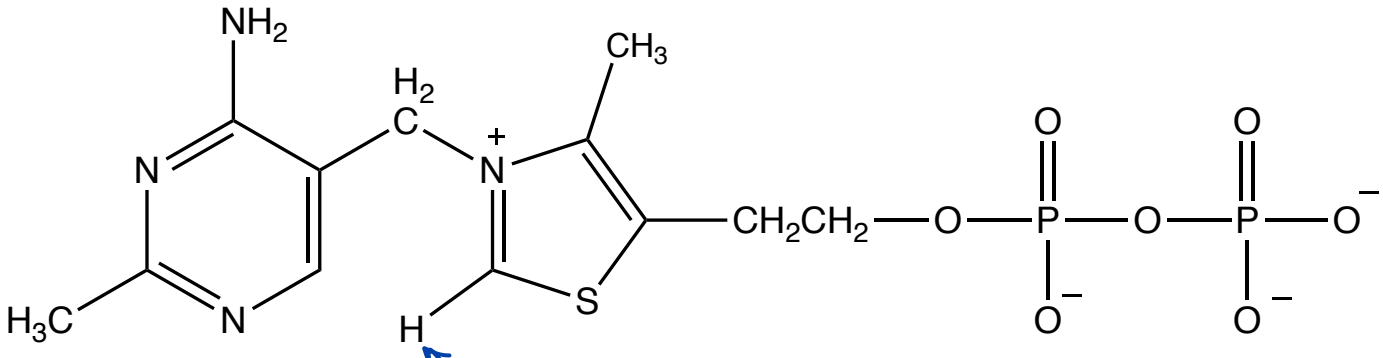
like using a fuel cell to capture e^-'s from a fuel, using them to do work in an electrical system, and eventually depositing them on O

Pyruvate Dehydrogenase Complex: Pyruvate Decarboxylase

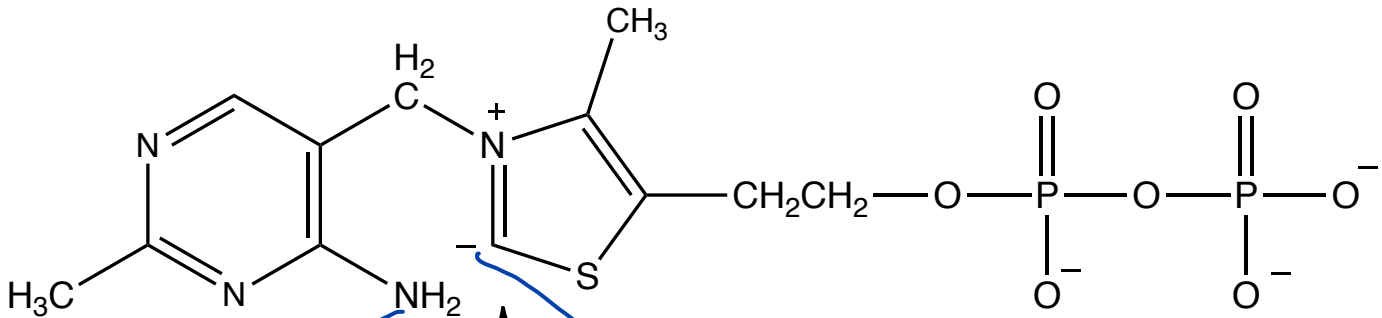
Section 16.1



Thiamine Pyrophosphate



this has to get pulled off as H^+ so C will become negative



H-bond acceptor

H-bond donor

deprotonated version

lp e^-'s on C are stabilized by H-bond donation from NH_2 and by the ⊕ charge on the N