

Table 19.1 Citric acid cycle

Step	Reaction	Enzyme	Prosthetic group	Type*	$\Delta G^{\circ\prime}$	
					kJ mol^{-1}	kJ mol^{-1}
1	Acetyl CoA + oxaloacetate + $\text{H}_2\text{O} \rightarrow$ citrate + CoA + H^+	Citrate synthase		a	-31.4	-7.5
2a	Citrate \rightleftharpoons cis-aconitate + H_2O	Aconitase	Fe-S	b	+8.4	+2.0
2b	cis-Aconitate + $\text{H}_2\text{O} \rightleftharpoons$ isocitrate	Aconitase	Fe-S	c	-2.1	-0.5
3	Isocitrate + $\text{NAD}^+ \rightleftharpoons$ α -ketoglutarate + CO_2 + NADH	Isocitrate dehydrogenase		d + e	-8.4	-2.0
4	α -Ketoglutarate + NAD^+ + CoA \rightleftharpoons succinyl CoA + CO_2 + NADH	α -Ketoglutarate dehydrogenase complex	Lipoic acid, FAD, TPP	d + e	-30.1	-7.2
5	Succinyl CoA + P_i + ADP \rightleftharpoons succinate + ATP + CoA	Succinyl CoA synthetase		f	-3.3	-0.8
6	Succinate + FAD (enzyme-bound) \rightleftharpoons fumarate + FADH_2 (enzyme-bound)	Succinate dehydrogenase	FAD, Fe-S	e	0	0
7	Fumarate + $\text{H}_2\text{O} \rightleftharpoons$ L-malate	Fumarase		e	-3.8	-0.9
8	L-Malate + $\text{NAD}^+ \rightleftharpoons$ oxaloacetate + NADH + H^+	Malate dehydrogenase		e	+29.7	+7.1

*Reaction type: a, condensation; b, dehydration; c, hydration; d, decarboxylation; e, oxidation; f, substrate-level phosphorylation.

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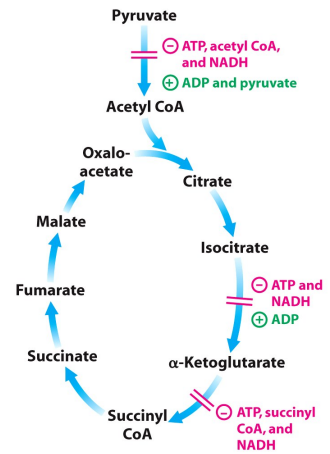


Figure 19.7
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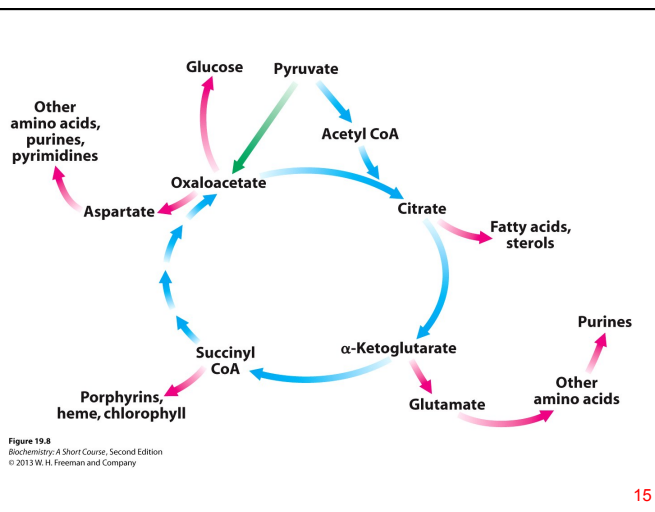


Figure 19.8
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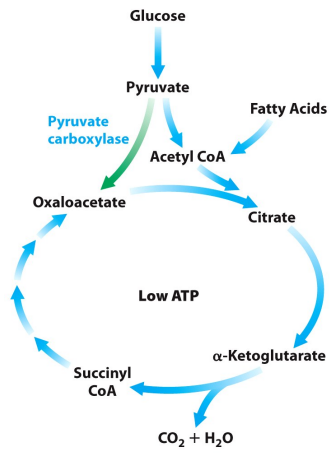


Figure 19.9
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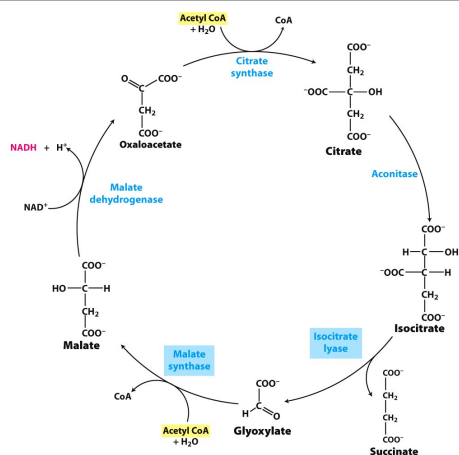


Figure 19.10
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