

TEMA 26

Ciclo del ácido cítrico. Papel central, reacciones, rendimiento energético y regulación. Reacciones anapleróticas. Ciclo del ácido glioxílico.

TEMA 26

Las Figuras recogidas en este tema proceden de los siguientes textos:

- Berg • Tymoczko • Stryer. Biochemistry. Sixth Edition. 2007. W. H. Freeman and Company.

- Donald Voet • Judith G. Voet • Charlotte W. Pratt. Fundamentals of Biochemistry. Second Edition. 2006 by John Wiley & Sons, Inc.

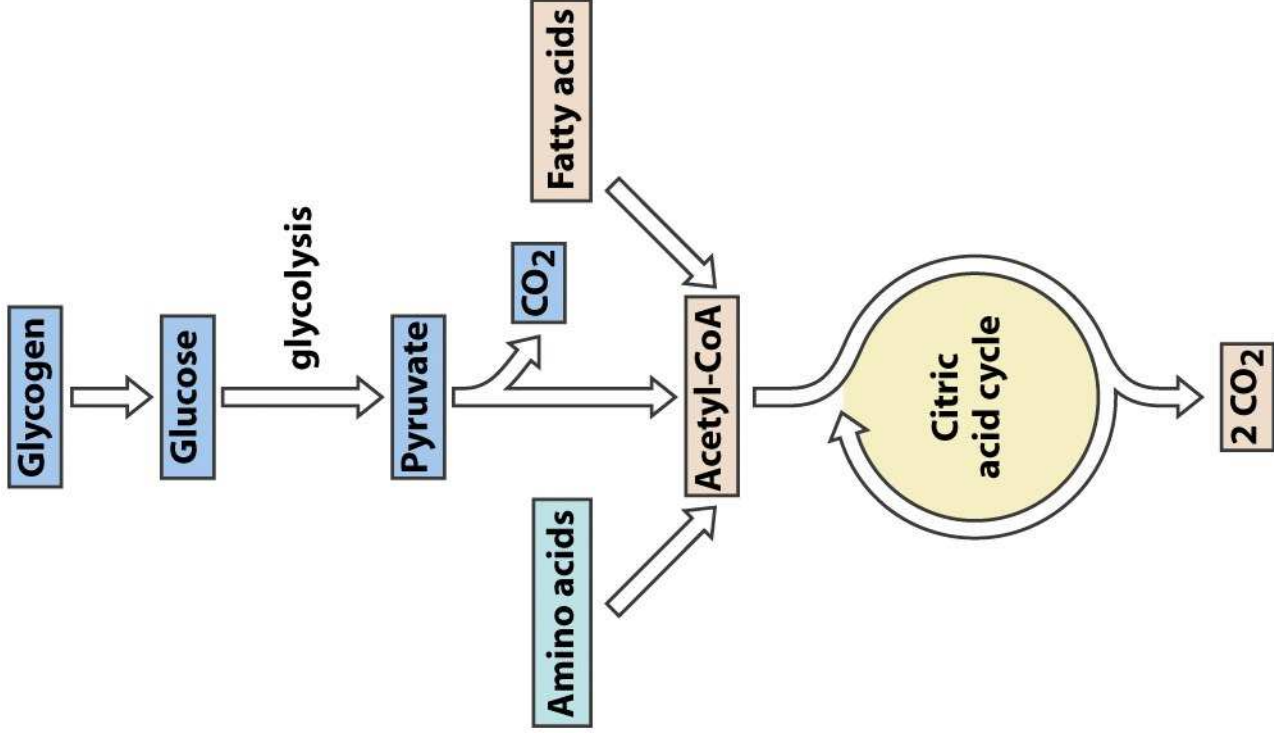
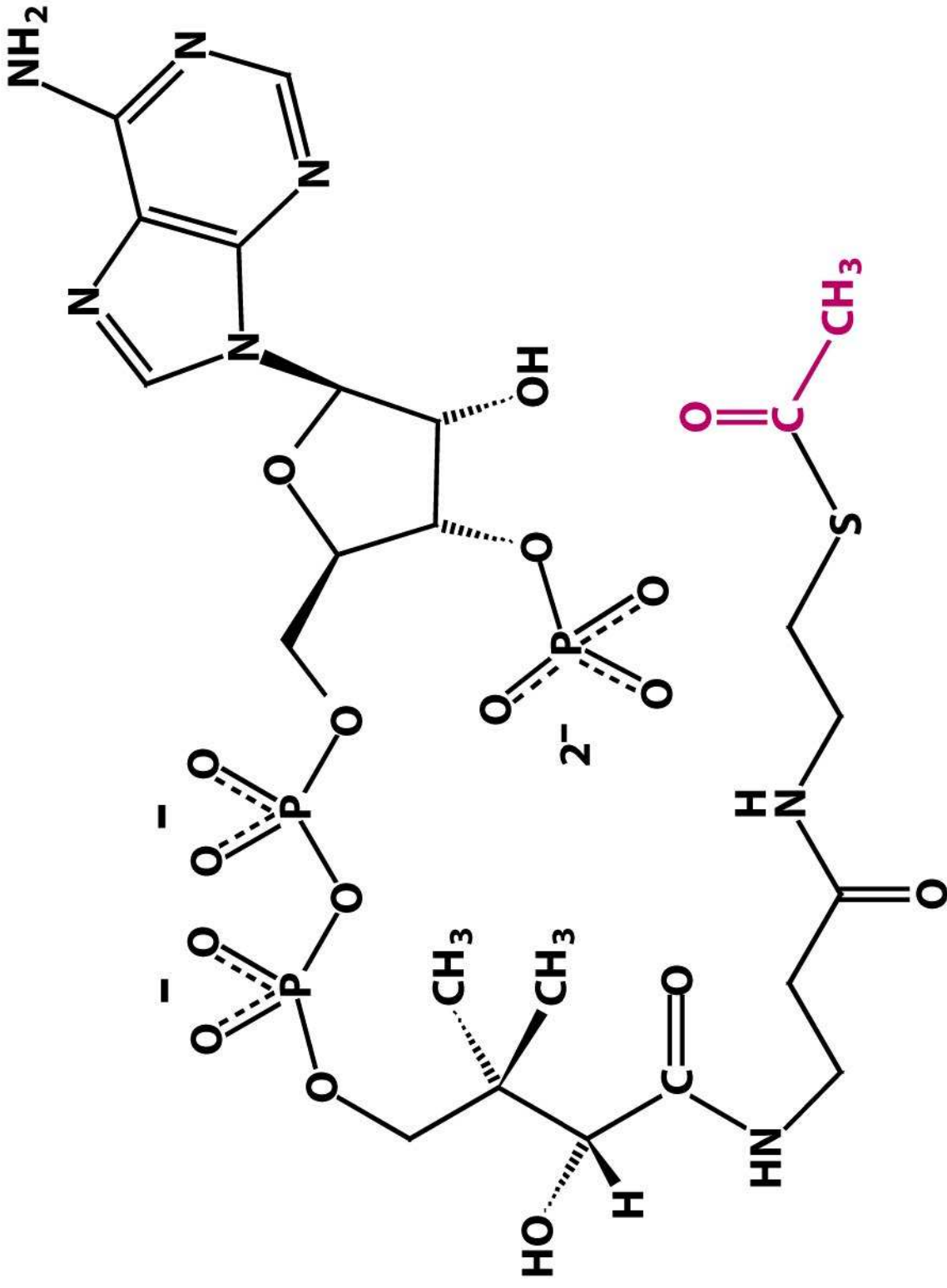
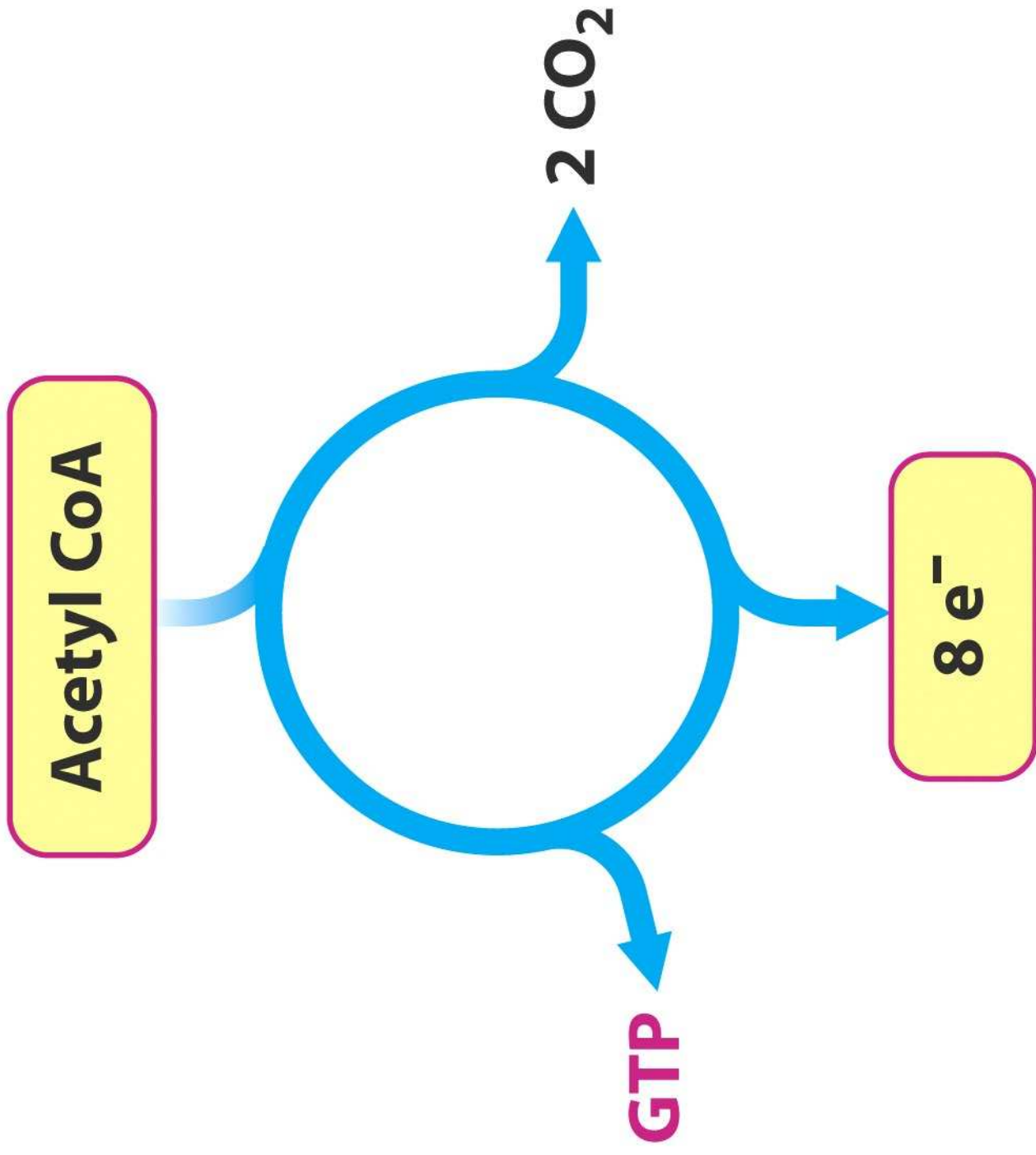


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Acetyl coenzyme A (Acetyl CoA)



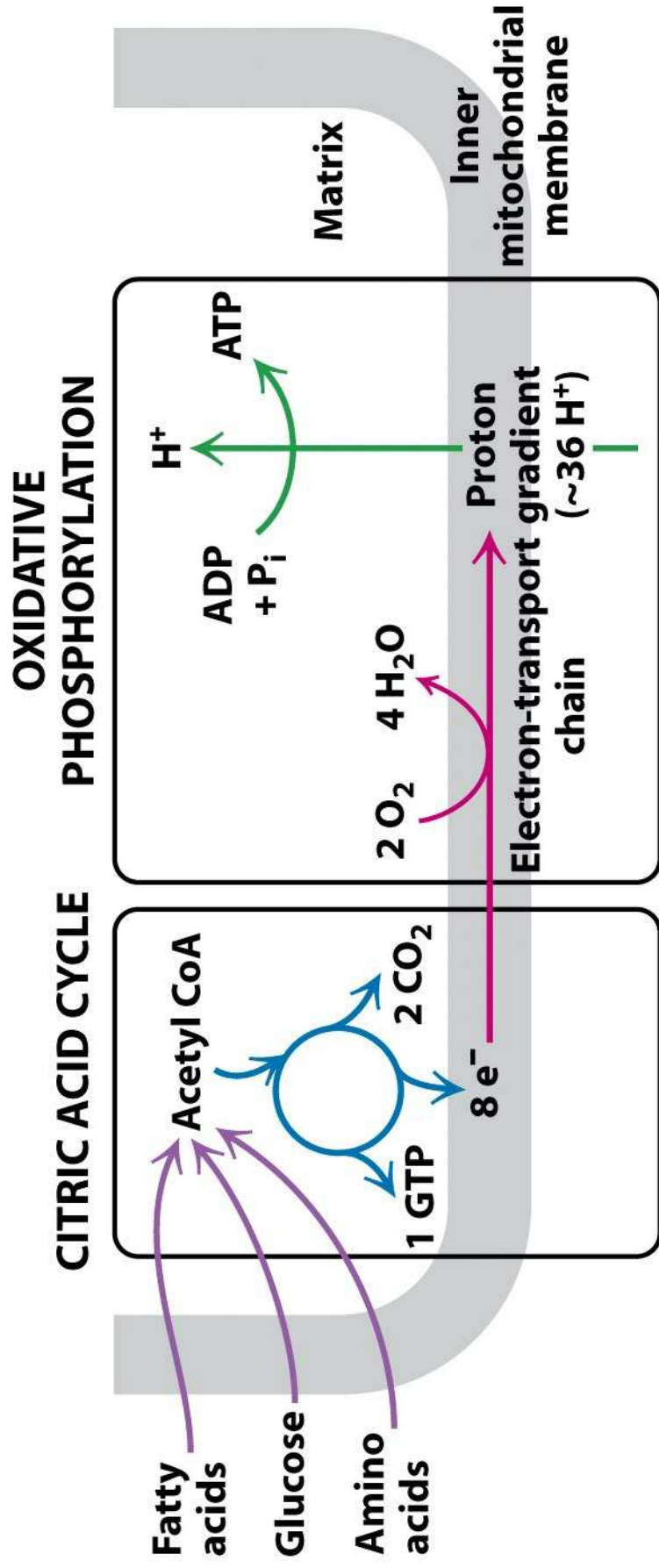


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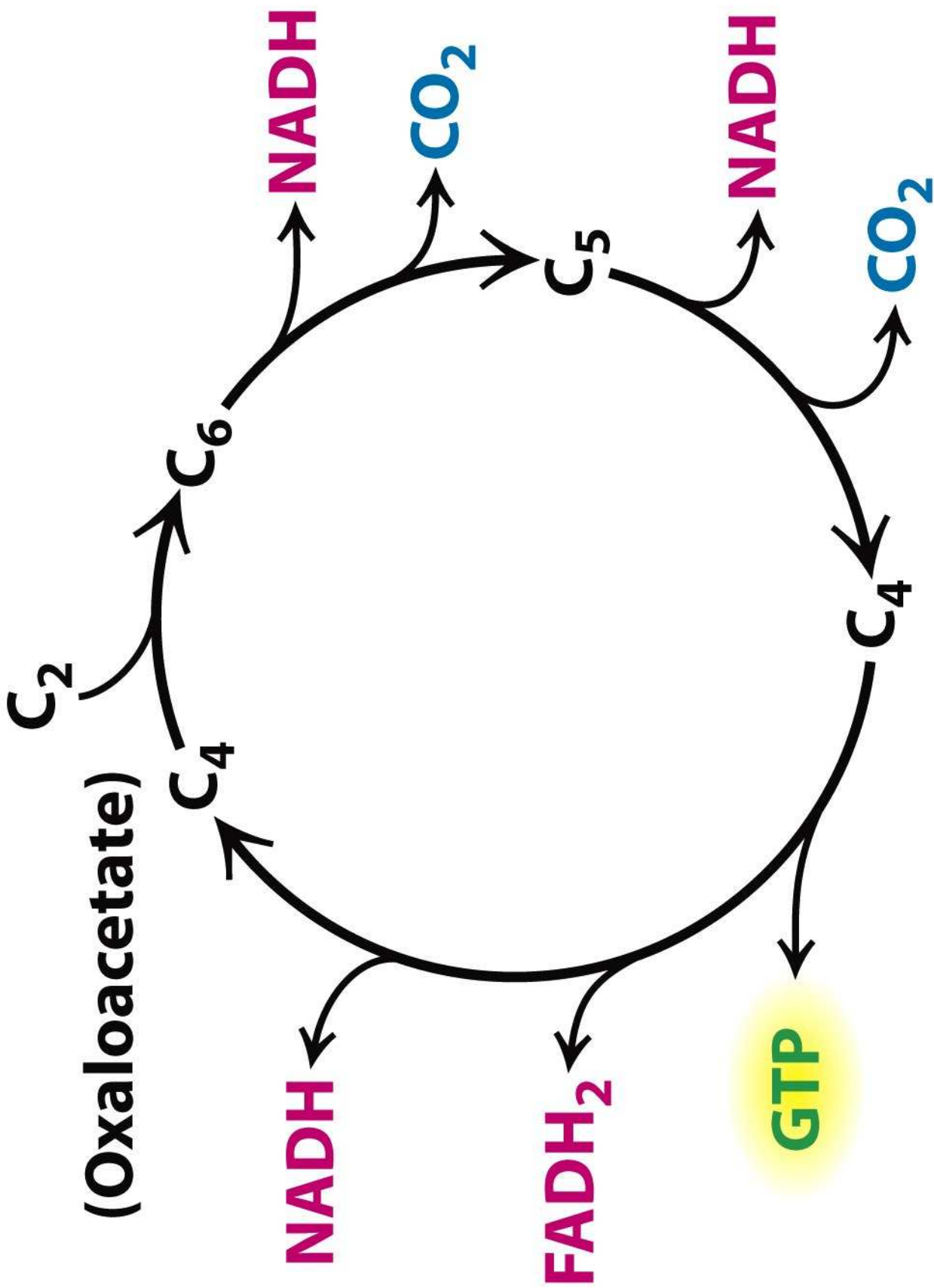
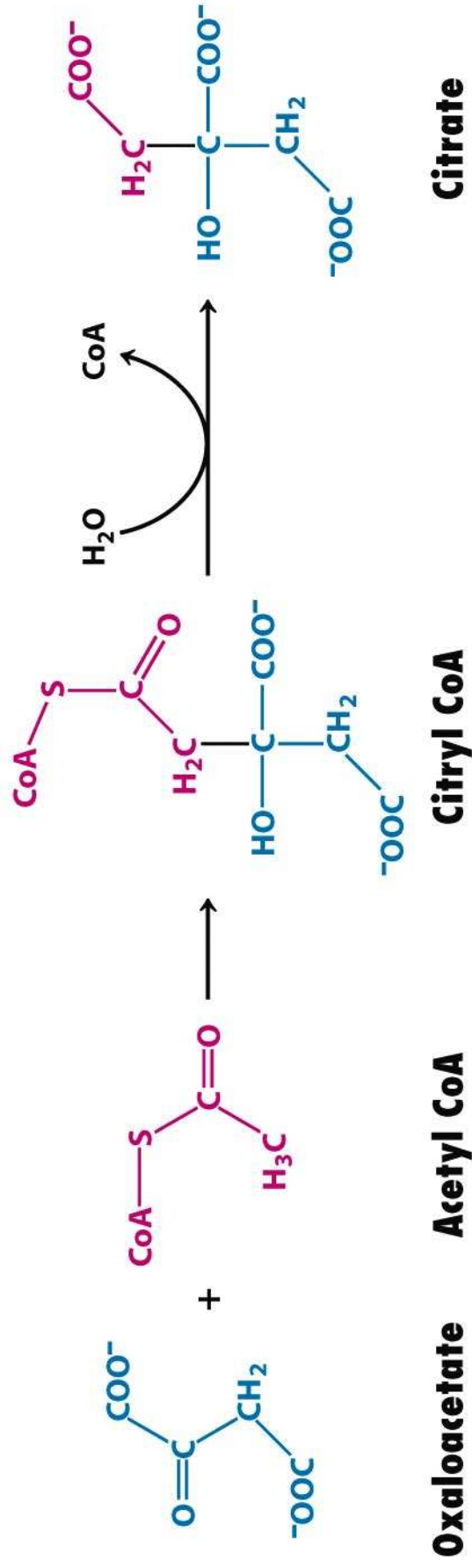


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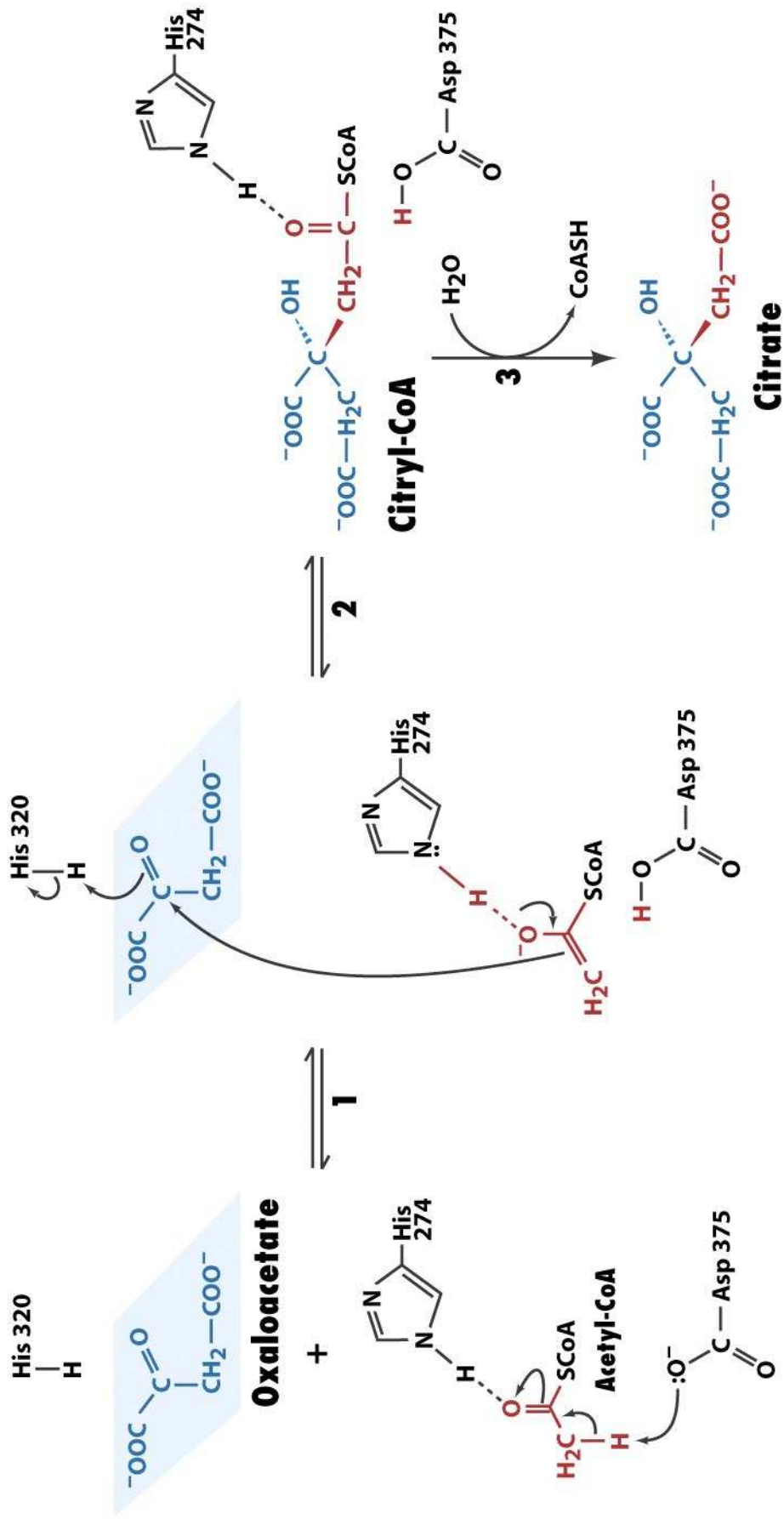
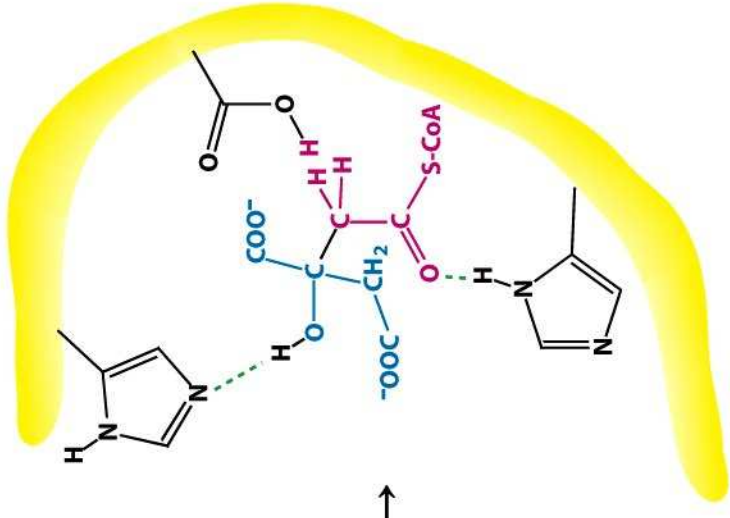
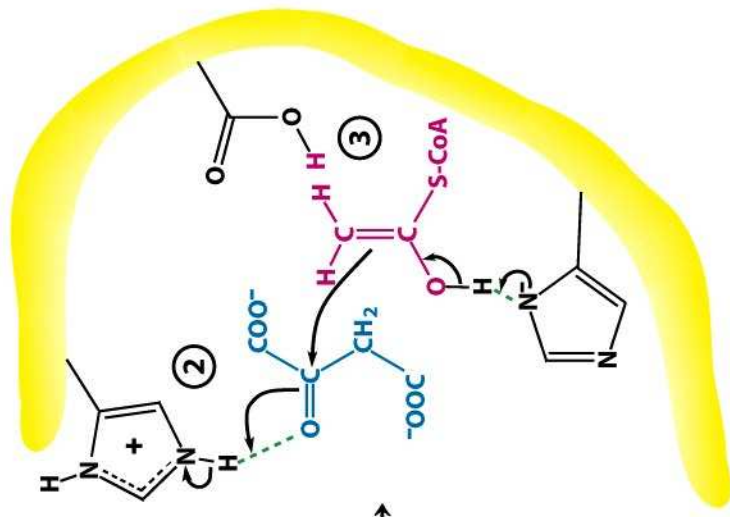


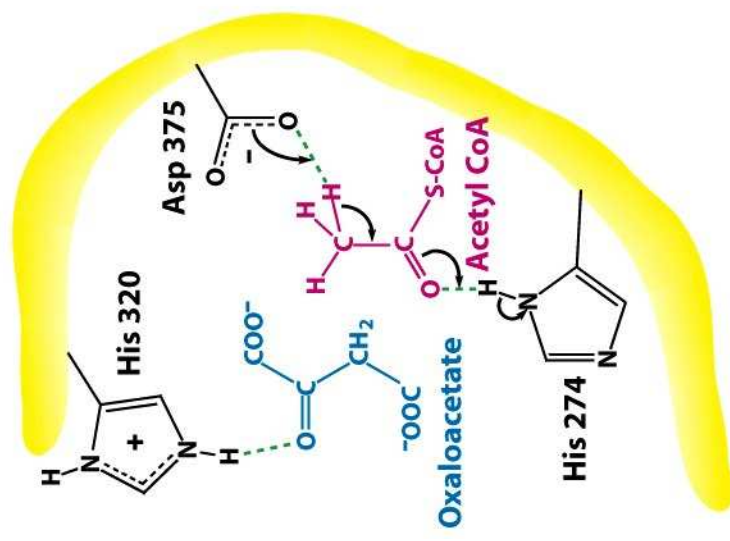
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Citryl CoA complex

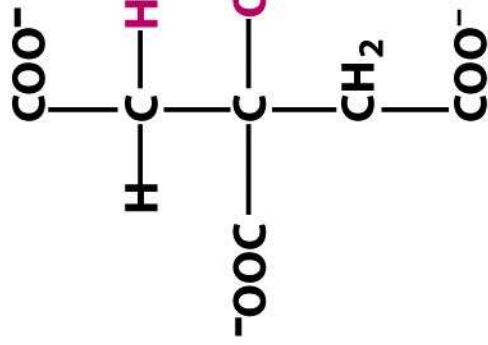


Enol intermediate

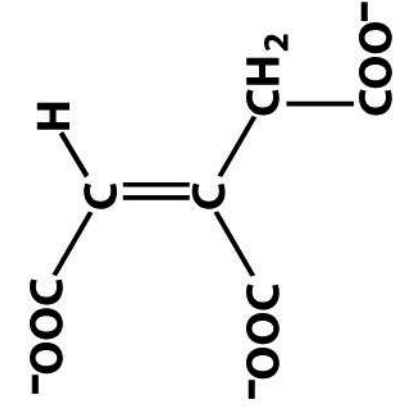
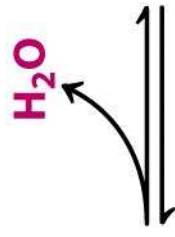


Substrate complex

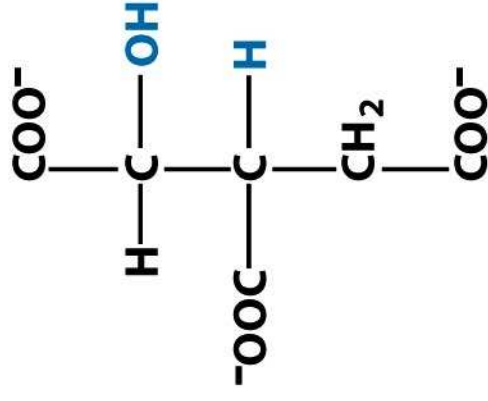
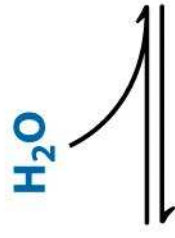
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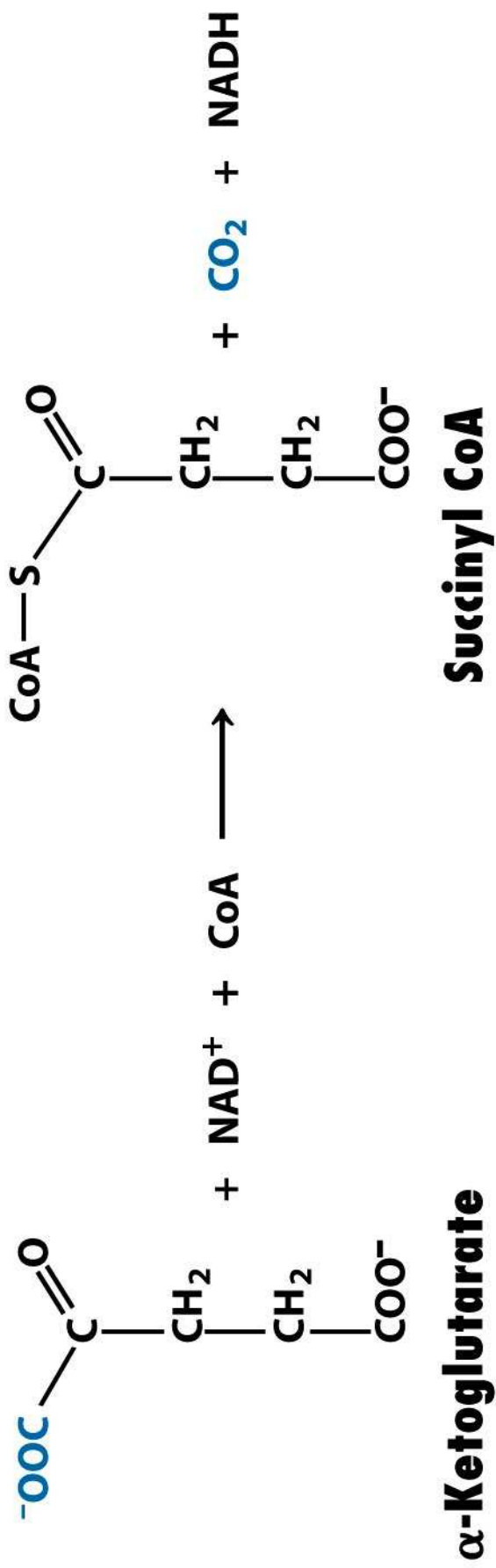
Citrate



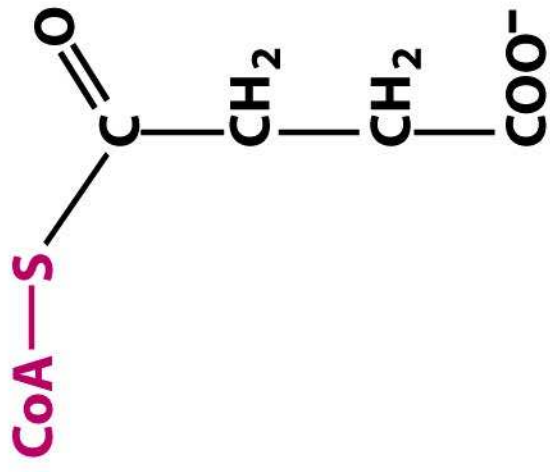
***cis*-Aconitate**



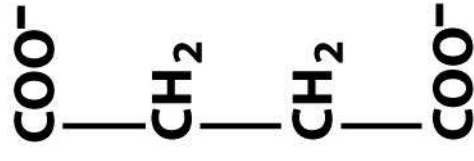
Isocitrate



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Succinyl CoA



Succinate

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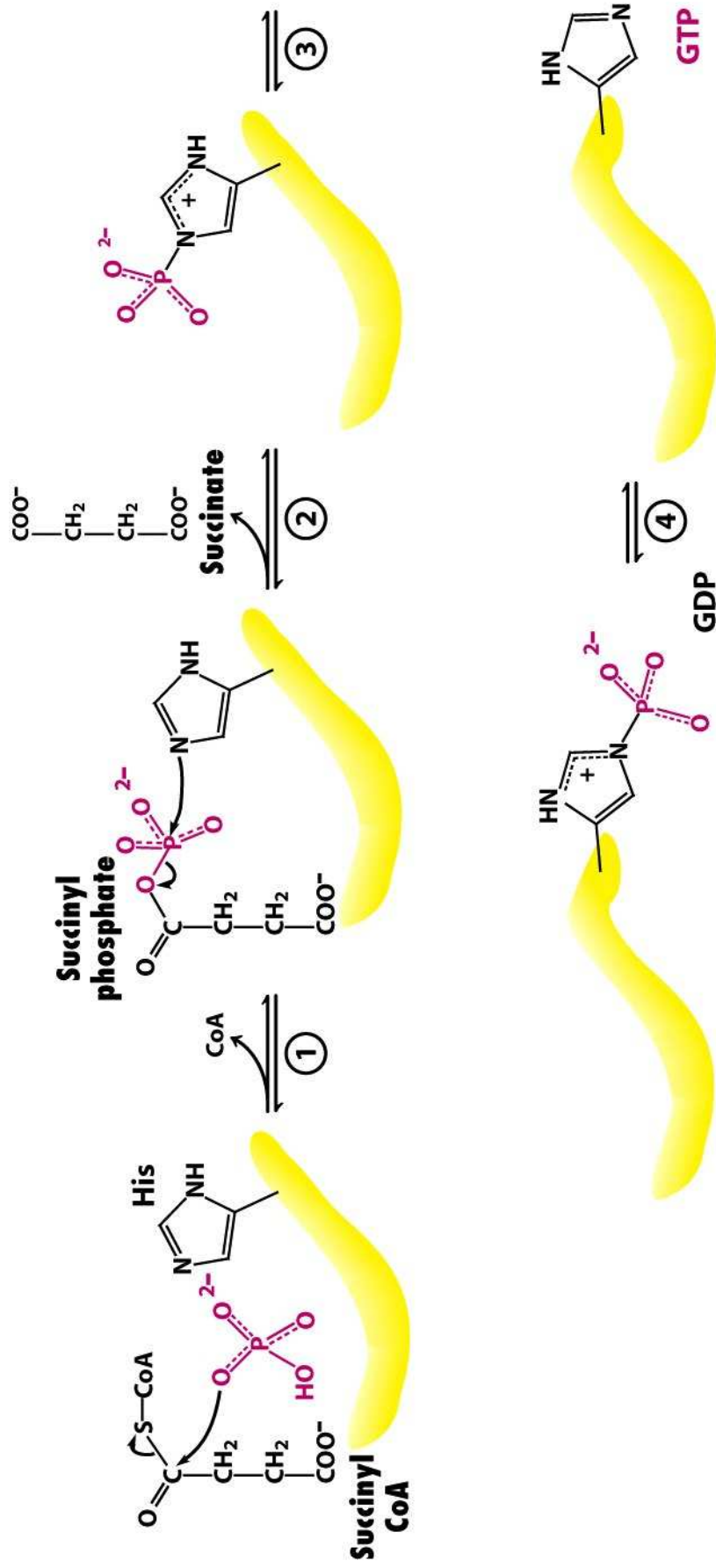


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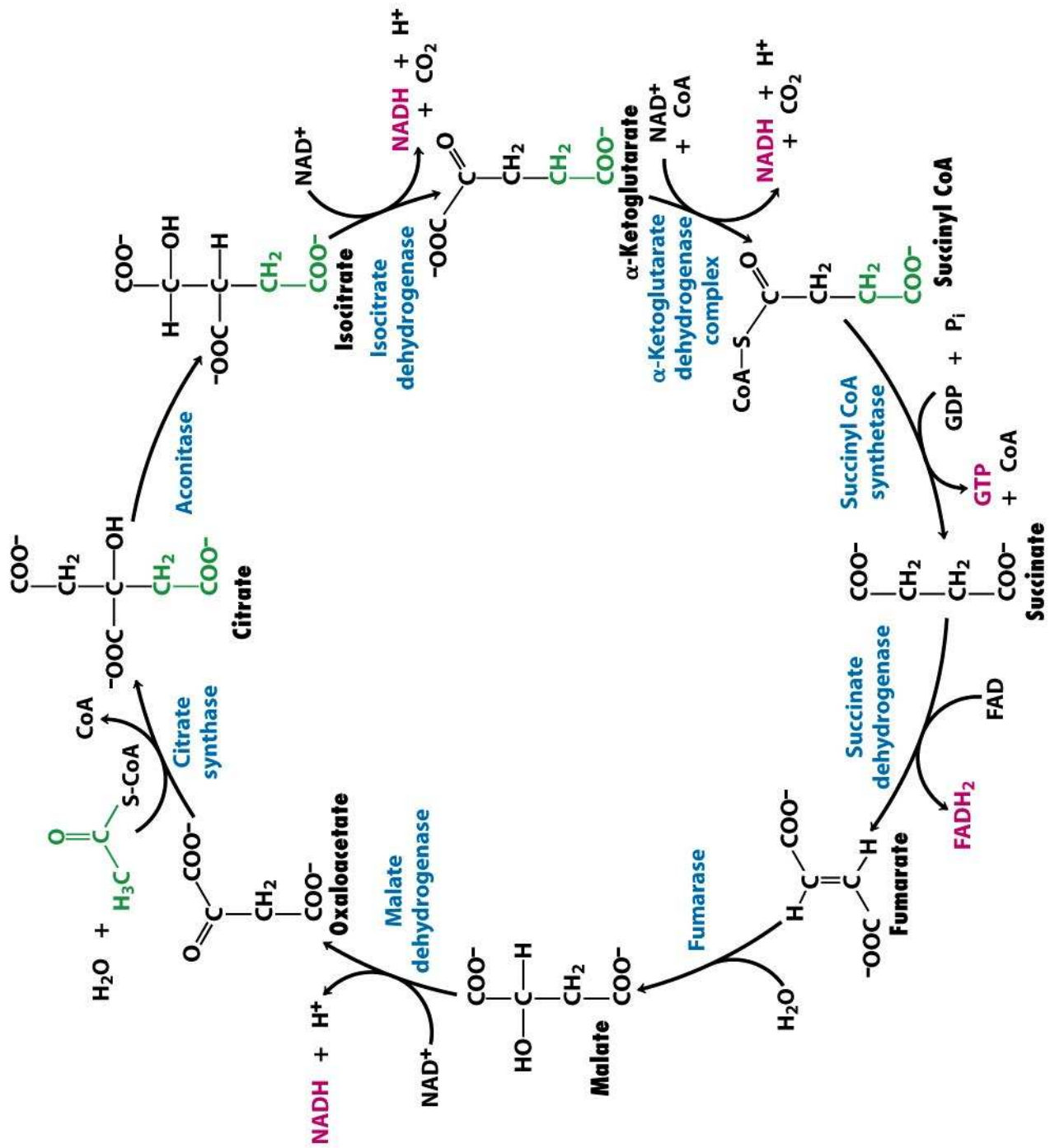


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TABLE 17.2 Citric acid cycle

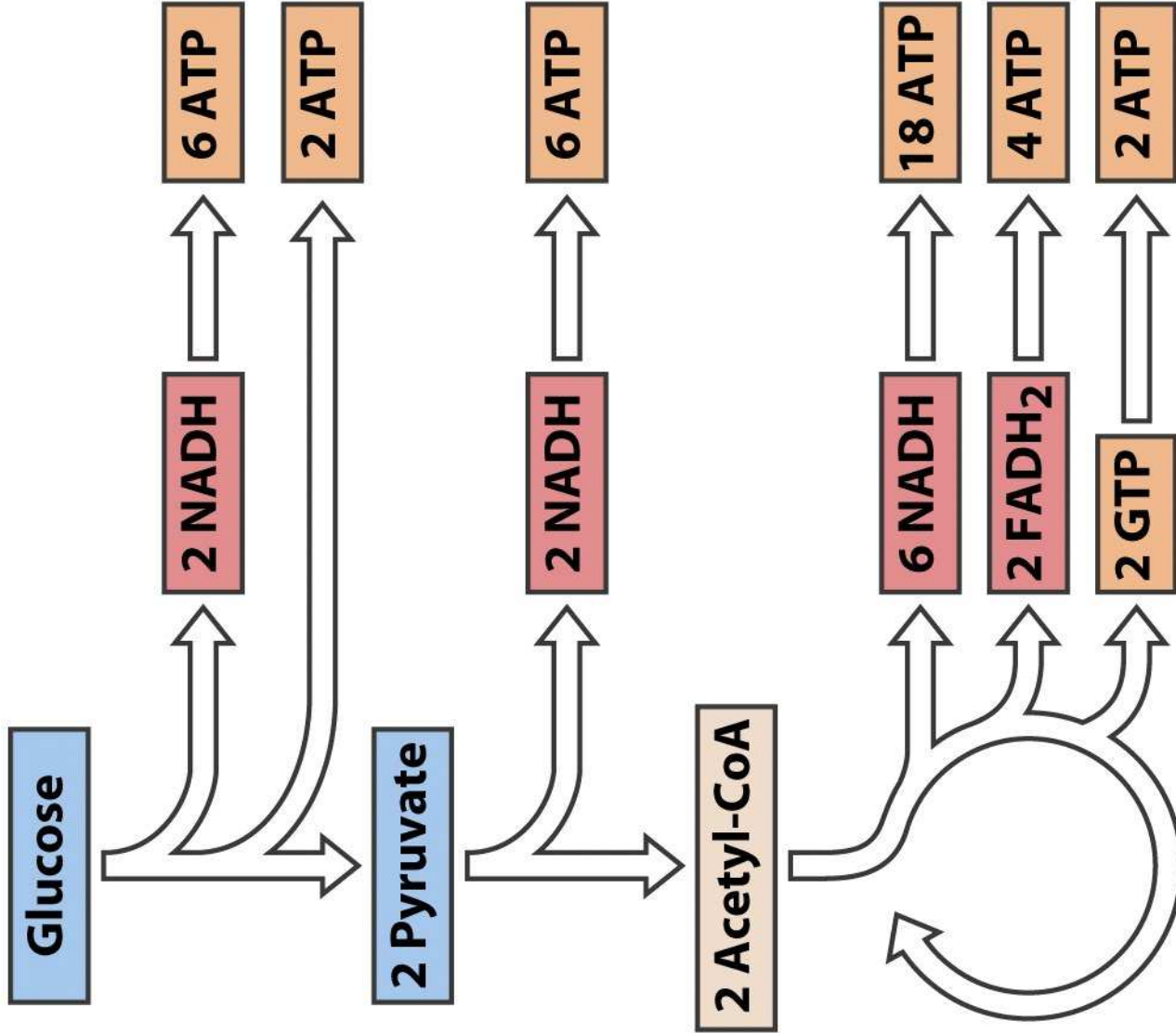
Step	Reaction	Enzyme	Prosthetic group	Type*	ΔG°	
					kJ mol ⁻¹	kcal mol ⁻¹
1	Acetyl CoA + oxaloacetate + H ₂ O → citrate + CoA + H ⁺	Citrate synthase		a	-31.4	-7.5
2a	Citrate ⇌ <i>cis</i> -aconitate + H ₂ O	Aconitase	Fe-S	b	+8.4	+2.0
2b	<i>cis</i> -Aconitate + H ₂ O ⇌ isocitrate	Aconitase	Fe-S	c	-2.1	-0.5
3	Isocitrate + NAD ⁺ ⇌ α-ketoglutarate + CO ₂ + NADH	Isocitrate dehydrogenase		d + e	-8.4	-2.0
4	α-Ketoglutarate + NAD ⁺ + CoA ⇌ succinyl CoA + CO ₂ + NADH	α-Ketoglutarate dehydrogenase complex	Lipoic acid, FAD, TPP	d + e	-30.1	-7.2
5	Succinyl CoA + P _i + GDP ⇌ succinate + GTP + CoA	Succinyl CoA synthetase		f	-3.3	-0.8
6	Succinate + FAD (enzyme-bound) ⇌ fumarate + FADH ₂ (enzyme-bound)	Succinate dehydrogenase	FAD, Fe-S	e	0	0
7	Fumarate + H ₂ O ⇌ L-malate	Fumarase		c	-3.8	-0.9
8	L-Malate + NAD ⁺ ⇌ 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.

Table 17-2

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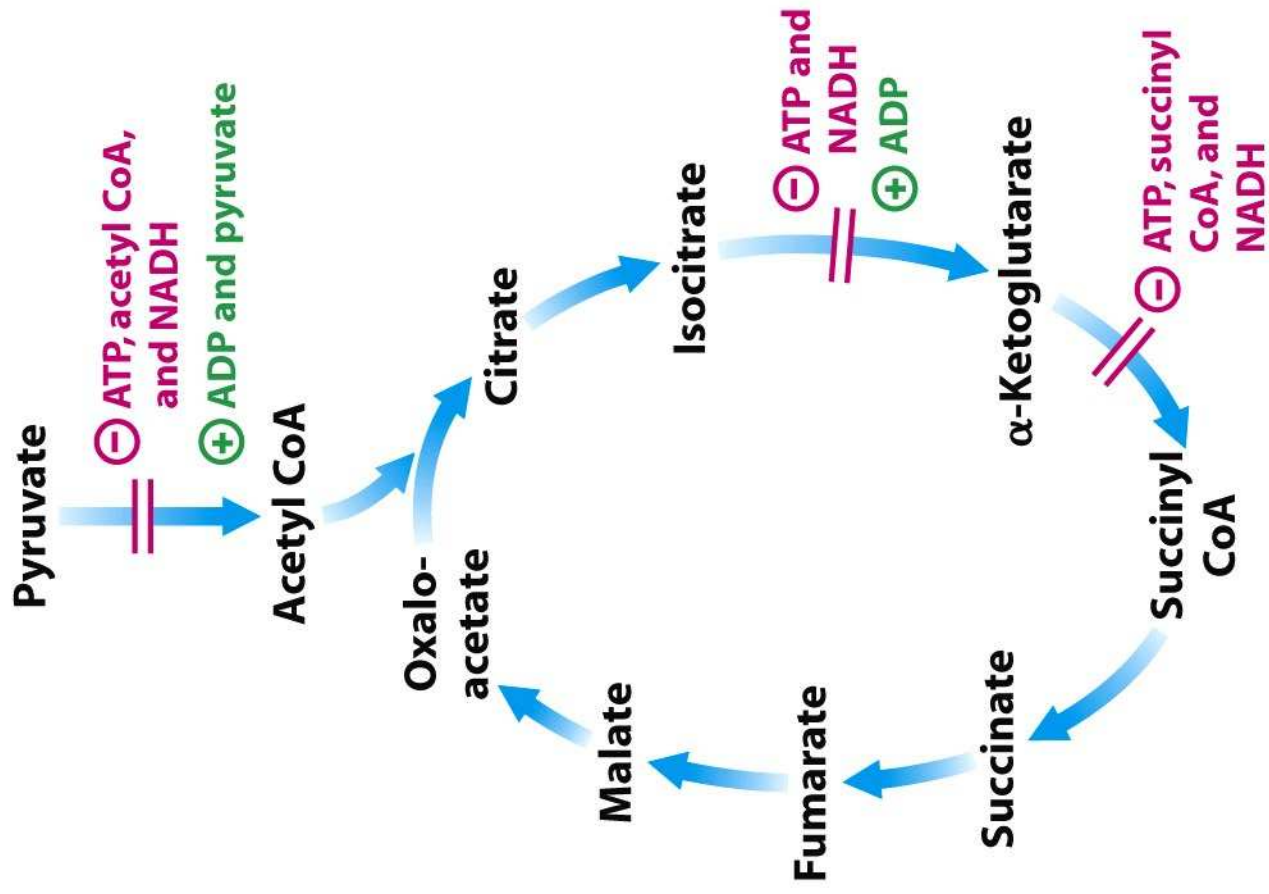


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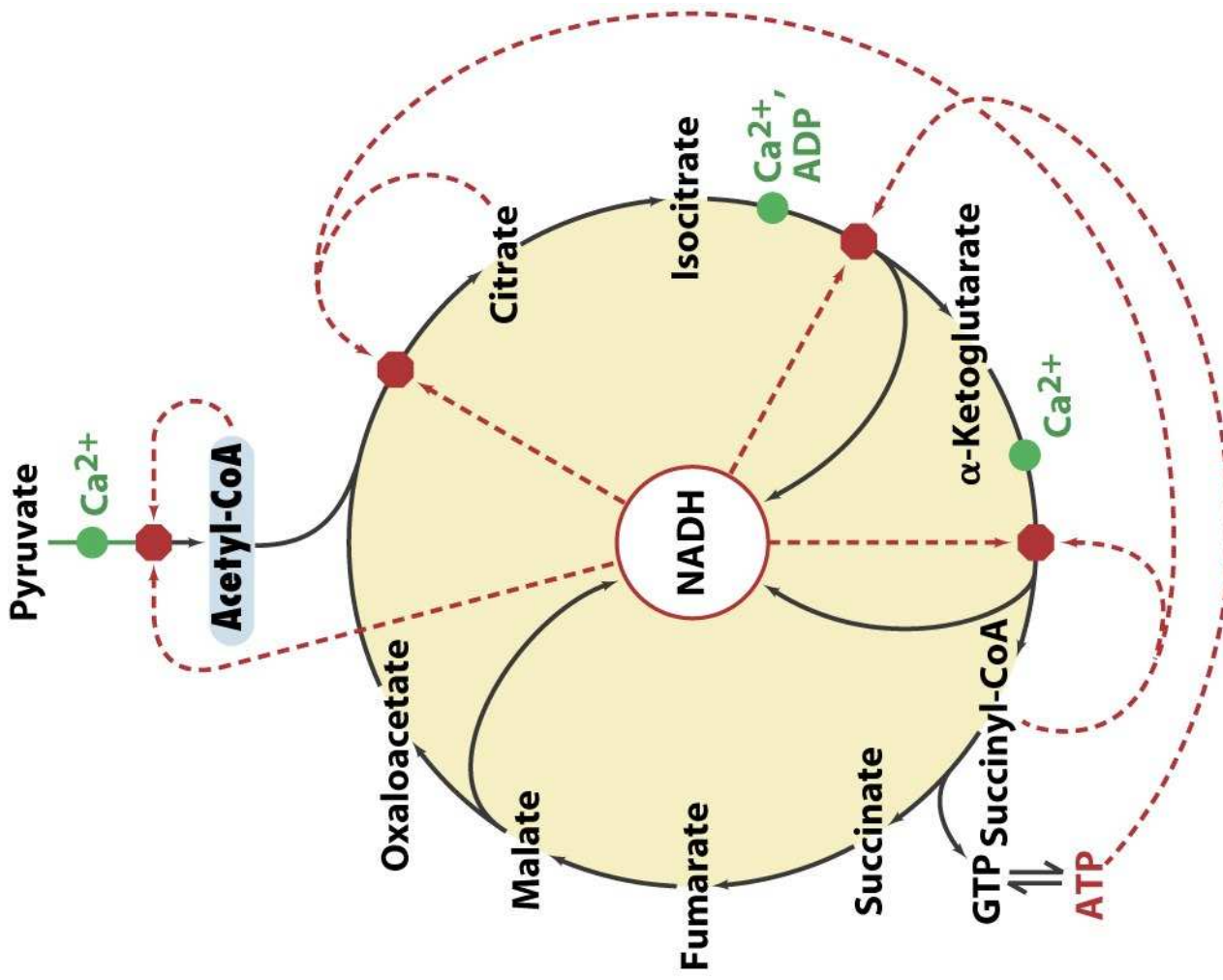


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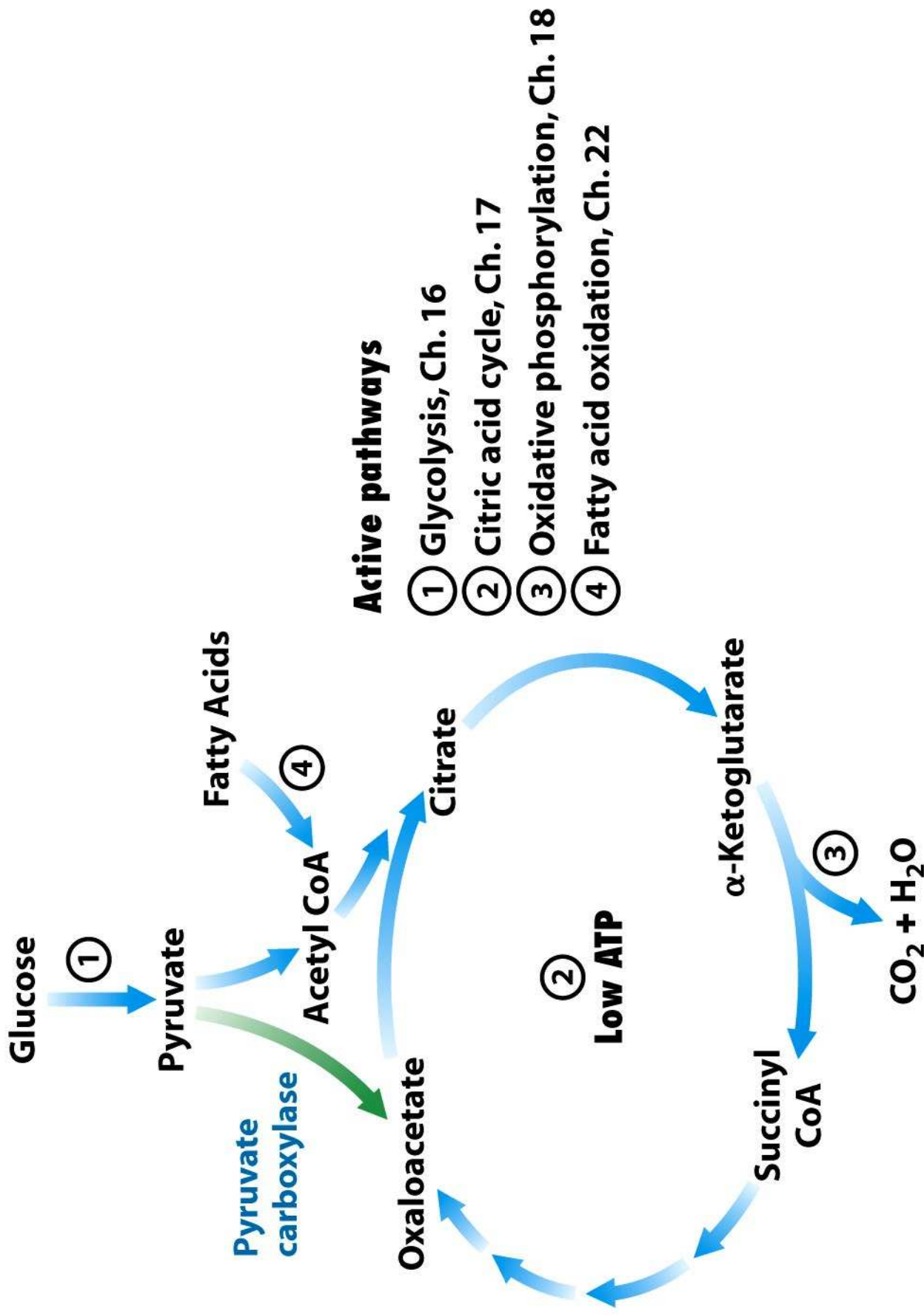


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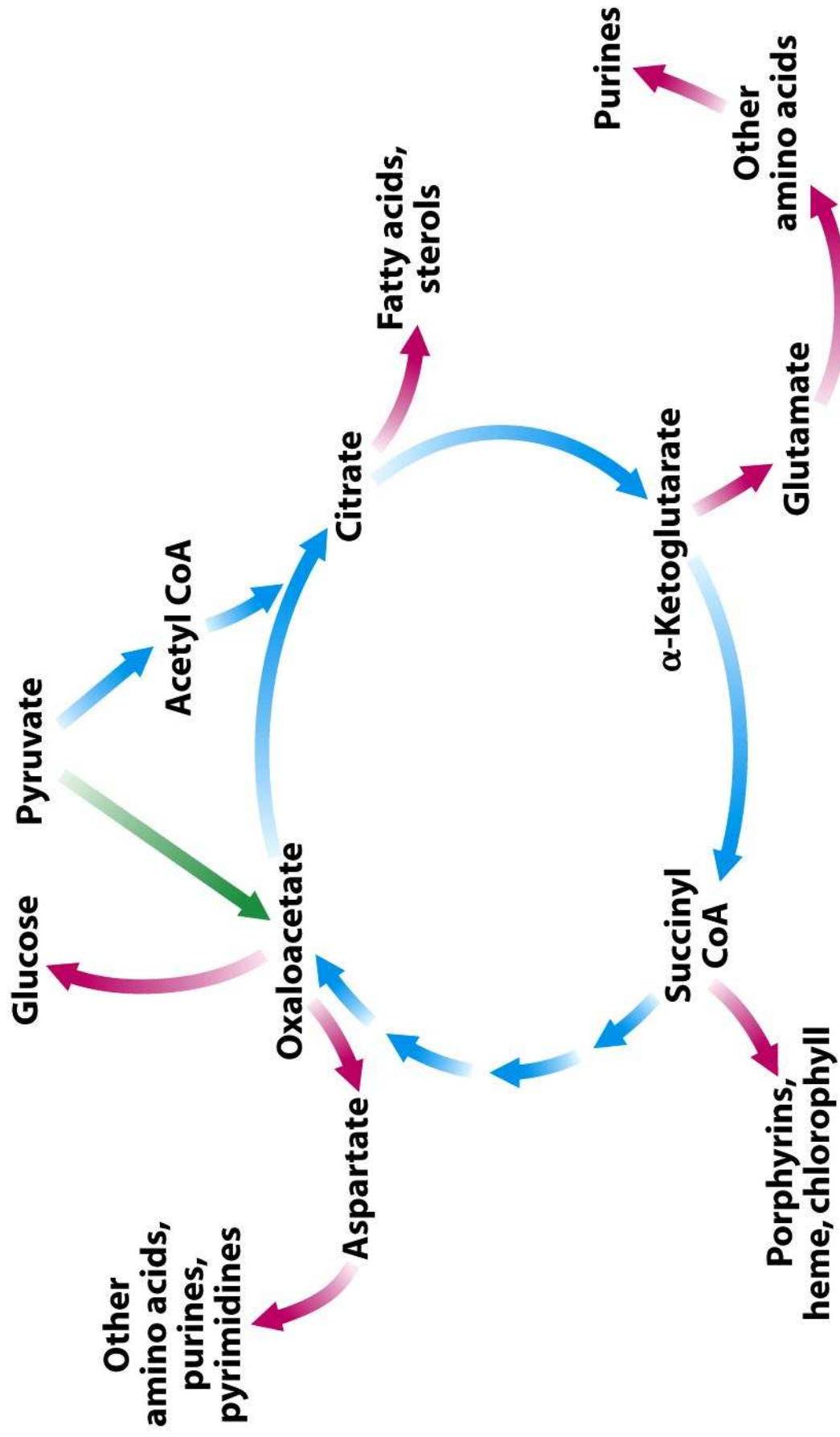


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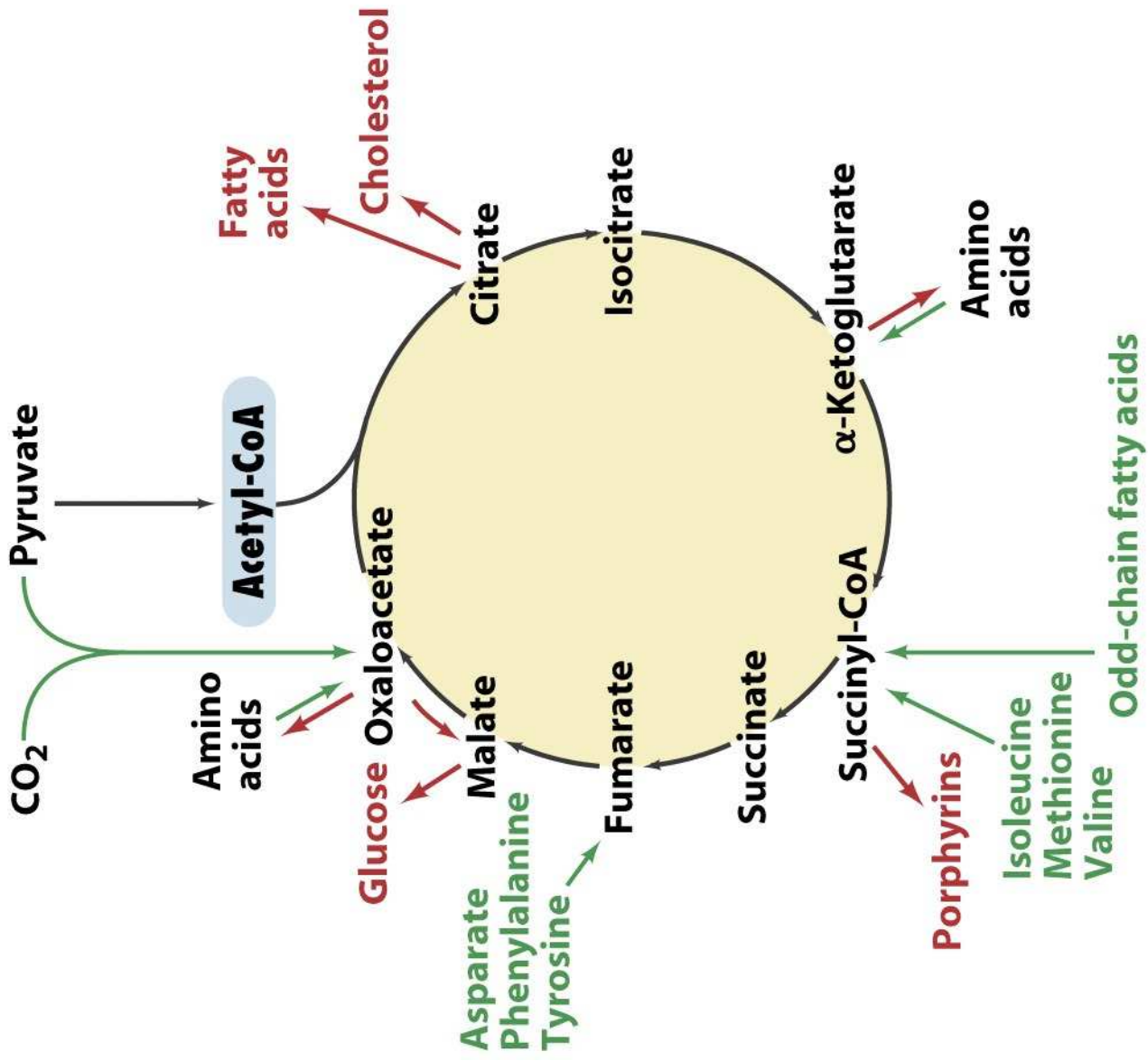
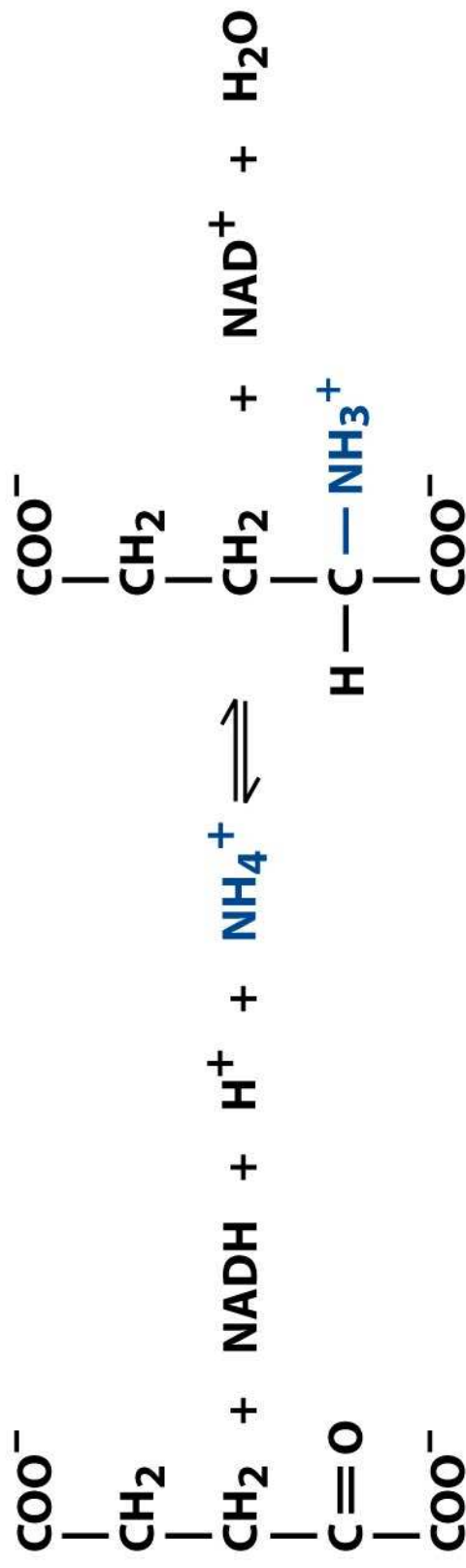


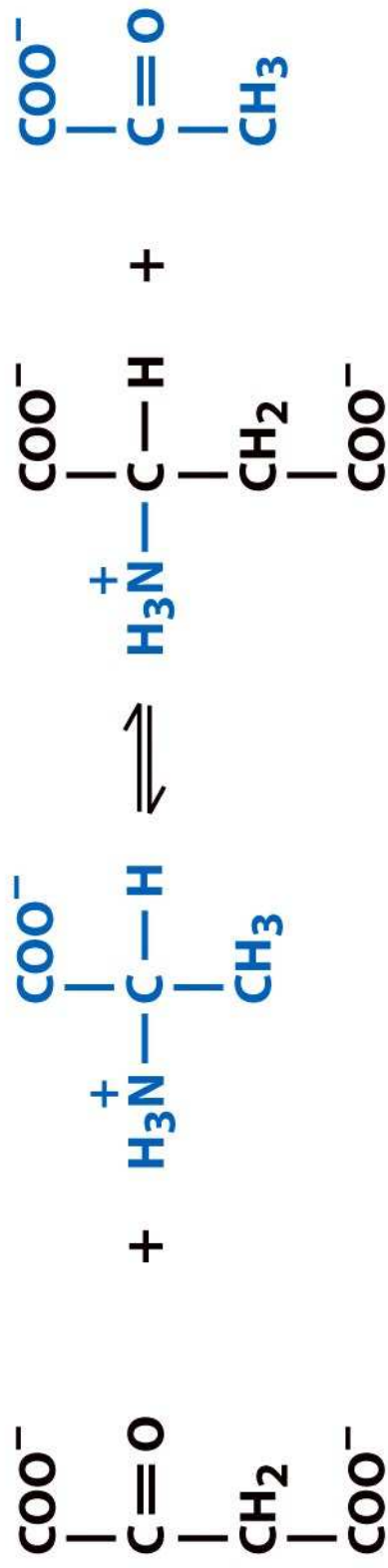
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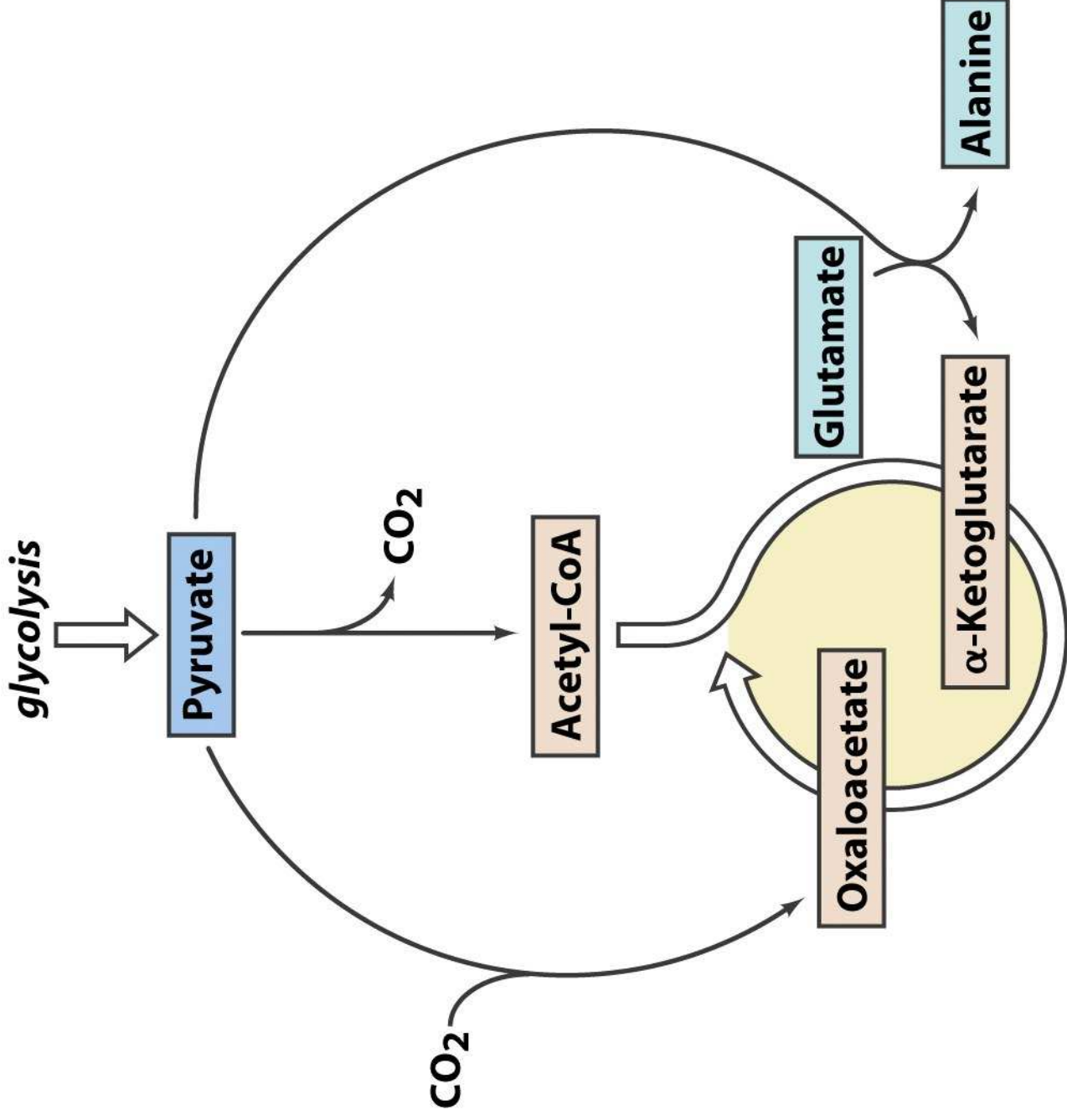
α -Ketoglutarate

Glutamate

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Oxaloacetate Alanine Aspartate Pyruvate



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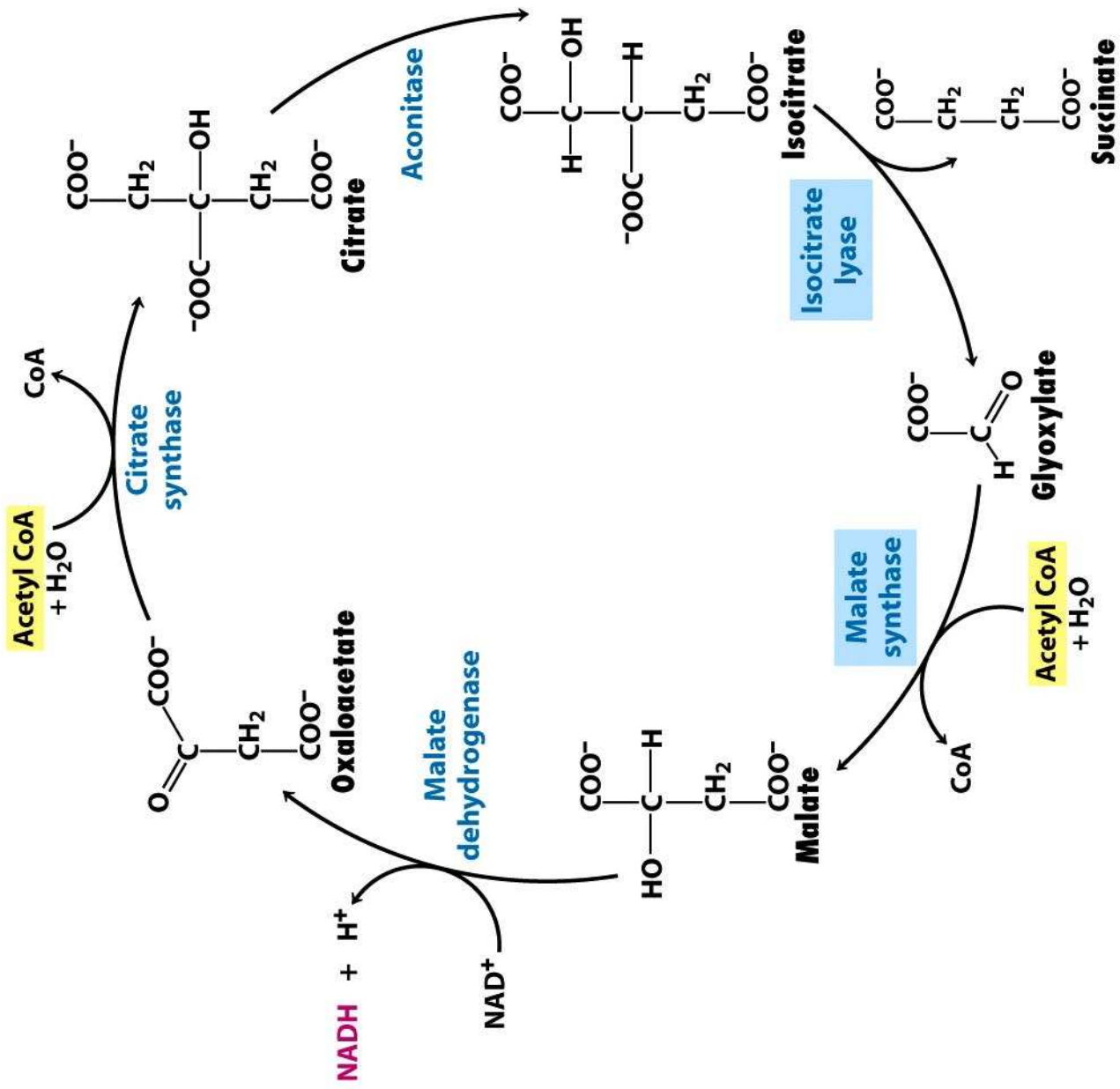


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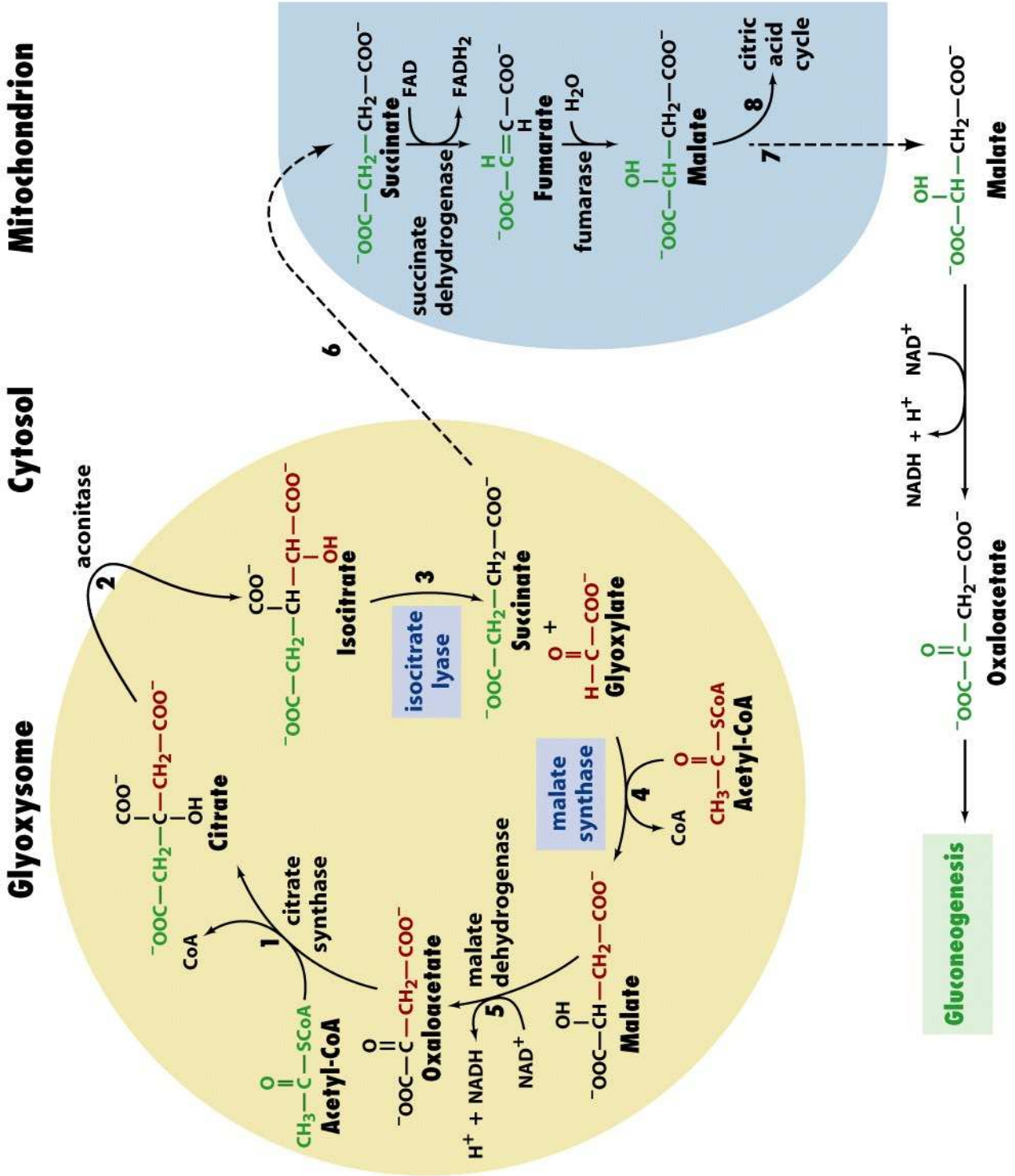
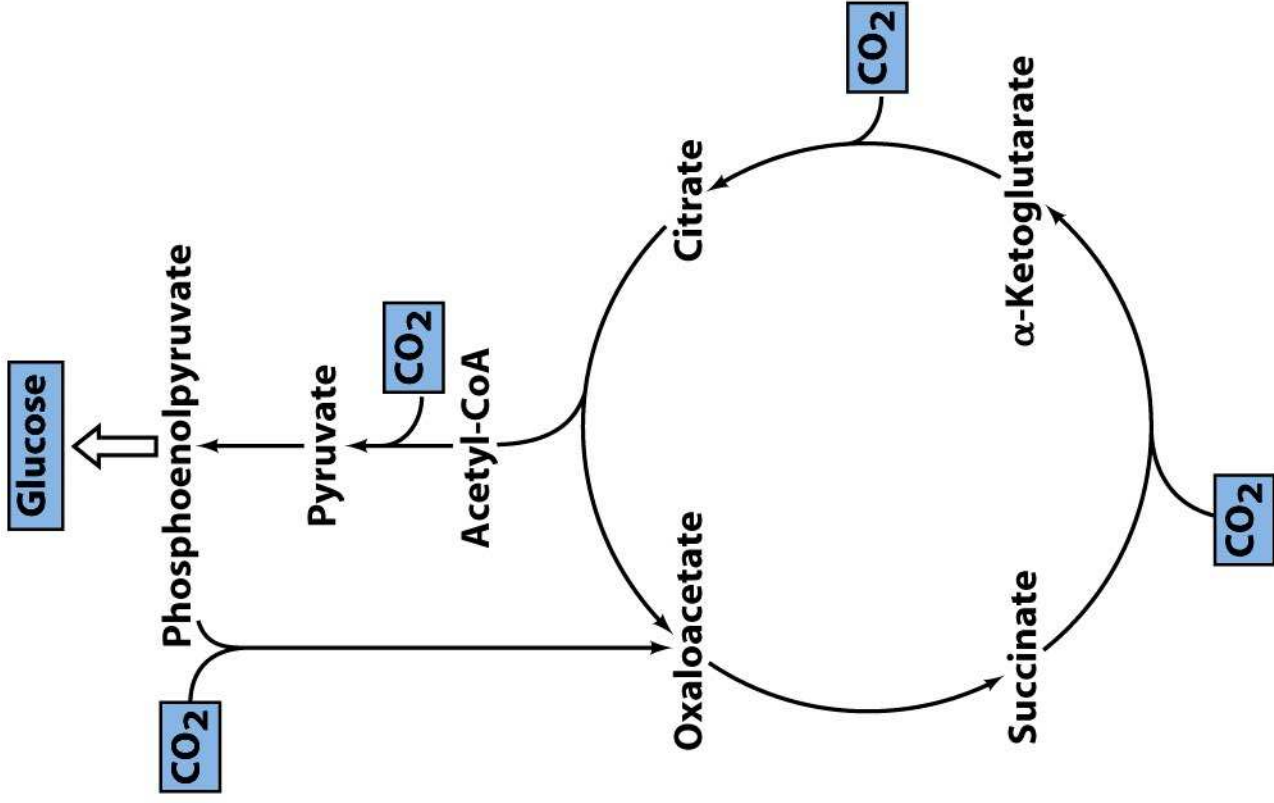


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Box 16-3 figure 4 Fundamentals of Biochemistry, 2/e
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