CONCEPT: STRUCTURES OF THE CITRIC ACID CYCLE

Citric Acid Cycle Structures

- The Citric Acid Cycle begins with oxaloacetate which is composed of ____ carbons.

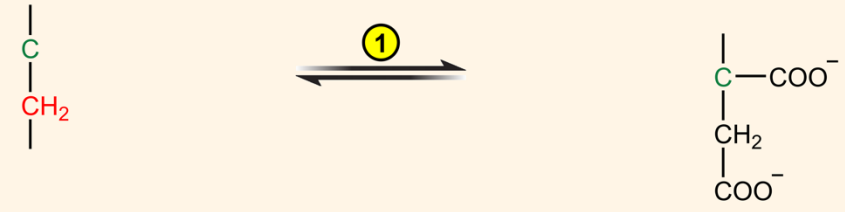
HINT 1: All metabolites contain _____ on both ends of molecules, **EXCEPT** Succinyl CoA.

HINT 2: Citrate and Isocitrate contain an extra _____ (_____carboxylic acids).

Phase A – Citrate Formation

- Oxaloacetate converts to citrate.

Phase A: Citric Acid Cycle



Oxaloacetate **Citrate**

Oxaloacetate

Memory Tool: **Oxa** = ketone; **acetate** = CH_3COO^-

Citrate

Memory Tool 1: Add **acetate** to ___ of oxaloacetate

Memory Tool 2: Citrus (__ acidic bites = __ COOHs)

EXAMPLE: Determine the type of chemical reaction in the transformation of oxaloacetate to citrate.

a) Electrophilic Addition

b) Nucleophilic Addition

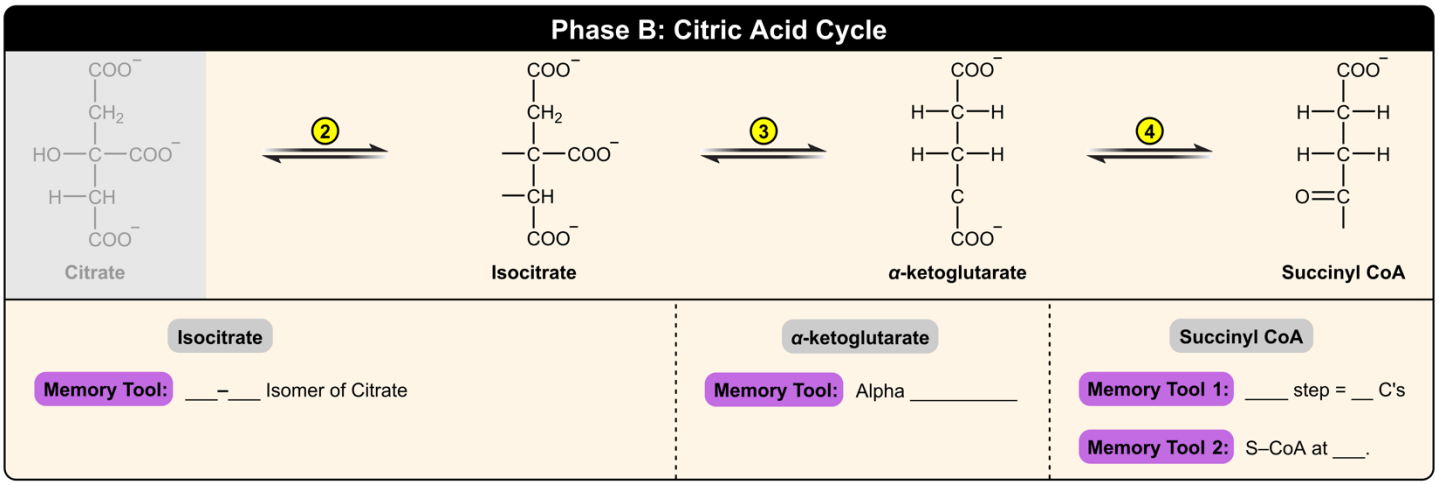
c) Nucleophilic Acyl Substitution

d) Reduction

CONCEPT: STRUCTURES OF THE CITRIC ACID CYCLE

Phase B – Succinyl CoA Formation

- Isocitrate to α-Ketoglutarate to Succinyl CoA.



EXAMPLE: Which of the following accurately describes the transformation of α-ketoglutarate to Succinyl CoA?

a) Reduction

b) Condensation

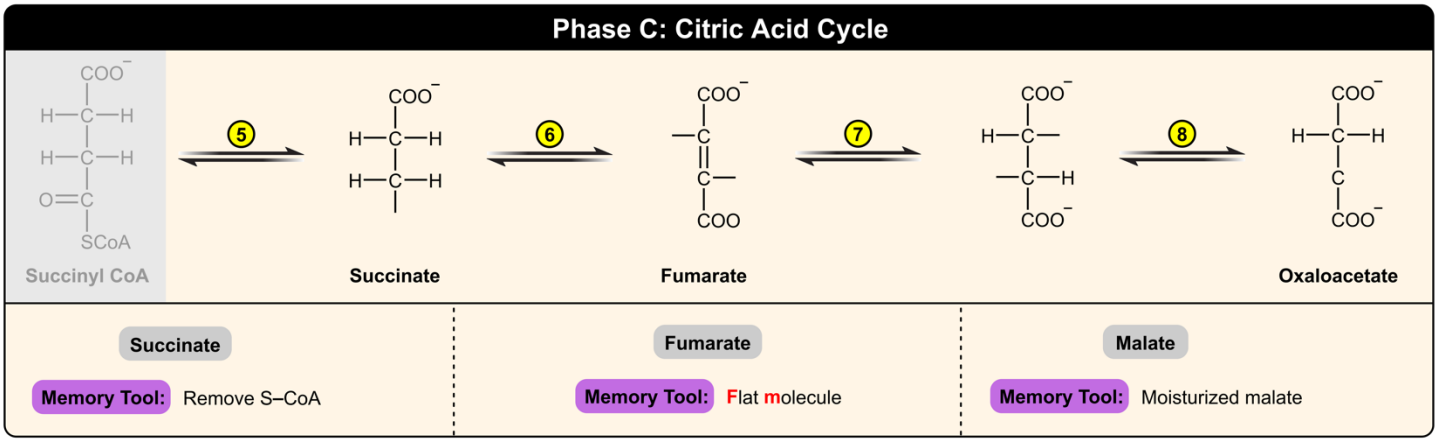
c) Oxidation

d) Hydration

CONCEPT: STRUCTURES OF THE CITRIC ACID CYCLE

Phase C – Oxaloacetate Regeneration

- Succinate to Fumarate to Malate.
  - □ At the end of the cycle, malate is oxidized to reform _____.



EXAMPLE: Which of the following compounds represents a tricarboxylic acid?

a) Succinyl CoA

b) Succinate

c) Fumarate

d) Isocitrate

PRACTICE: Which reactions of the citric acid cycle involve a decarboxylation?

a) Reactions 1 and 2

b) Reactions 2 and 4

c) Reactions 3 and 4

d) Reactions 3, 4, and 7

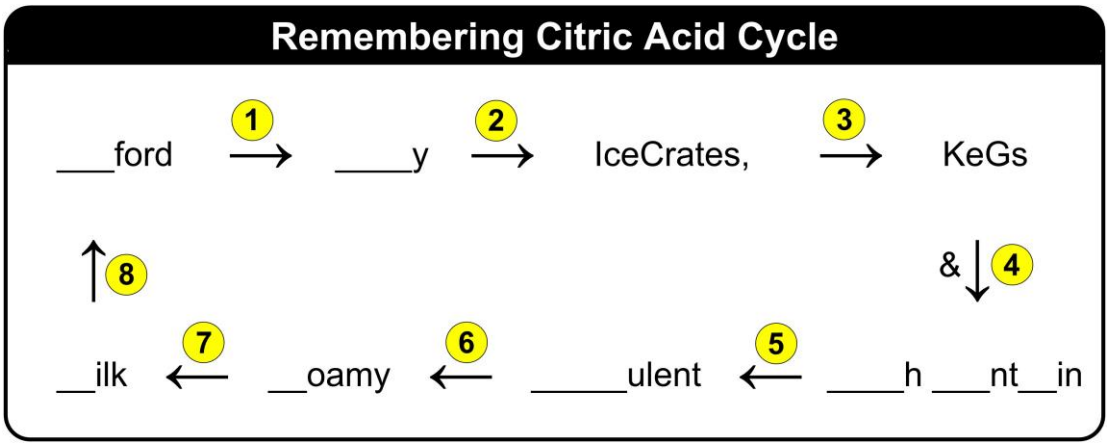
e) Reactions 2, 5, and 6

CONCEPT: STRUCTURES OF THE CITRIC ACID CYCLE

Remembering Citric Acid Cycle

● Each reaction of the citric acid cycle can be remembered by memorizing the intermediate (_____) names.

MEMORY TOOL: _____ford _____y IceCrates, KeGs, & _____h ____nt__in _____ulent __oamy __ilk.



EXAMPLE: Write the name for the substrate and product of reaction 6 of the citric acid cycle.

a) Succinyl CoA and succinate

b) Succinate and fumarate

c) Succinyl CoA and fumarate

d) Fumarate and malate

PRACTICE: Identify the reaction that involves an isomerization reaction between the substrate and product.

a) Reaction 1

b) Reaction 3

c) Reaction 8

d) Reaction 2

e) Reaction 4

PRACTICE: Identify the reaction that involves the creation of a product with planarity.

a) Reaction 1

b) Reaction 6

c) Reaction 8

d) Reaction 2

e) Reaction 4