

Aspartate

[Ass-potato](#)

The amine group in aspartate attacks the carbonyl carbon group on citrulline, working to form argininosuccinate, but can only do so with ATP and the enzyme argininosuccinate synthetase. Of note, this portion of the reaction occurs after transportation out of the mitochondrial matrix to the cytosol of liver cells.

Argininosuccinate

[Orange-suckers](#)

Argininosuccinate is formed by citrulline and aspartate in a reaction requiring ATP. The enzyme argininosuccinase promotes the breakdown of argininosuccinate into arginine and fumarate.

Fumarate

[Fuming](#)

Argininosuccinate is cleaved into arginine and fumarate. Fumarate is then used in the citric acid cycle, helping to form malate and later, oxaloacetate.

Arginine

[Orange-in-jeans](#)

The arginine produced in the earlier step is then broken down by arginase to produce urea and ornithine, with the addition of water.

H₂O to Urea

[Water changing into U-rainbow colors](#)

The enzyme arginase combines H₂O and arginine, synthesizing urea and ornithine. This urea is excreted out of the body in urine via the kidney.

Ornithine

[Hornets](#)

The ornithine produced in the previous step is recycled back to the mitochondria to be used in the next urea cycle.