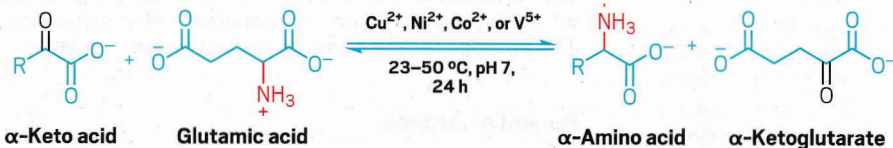


Metals can catalyze amino acid synthesis

Amino acids are fundamental to living organisms because they combine to build proteins, the cell's workhorses. One metabolic pathway to amino acids involves transamination, a reaction in which an amino group is transferred to a keto acid. Normally, an enzyme or cofactor catalyzes transamination. But Joseph Moran of the University of Strasbourg wondered whether this process happened without enzymes in the earliest days of life on Earth.

At high temperatures, metal ions can catalyze transamination. A new study shows that metals that were likely abundant on early Earth can perform the catalysis under biological conditions



R = amino acid chains

(*J. Am. Chem. Soc.* 2021, DOI: 10.1021/jacs.1c08535). The study's top performers—those that produced the highest yield of amino acids—were copper, cobalt, vanadium, and nickel.

Moran and his team analyzed how these metals catalyze the amino group transfer. “The metals essentially work in two different ways,” he says. Copper and cobalt stabilize an intermediate imine, and vanadium

accelerates the reaction by increasing the acidity of a key carbon-hydrogen bond. Nickel does a bit of both.

Moran says the results support the idea that the chemical framework for metabolism could have been present from the start of life on Earth, before complex proteins and genetic molecules like RNA evolved.—ALLA KATSNELSON, special to C&EN