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Finding may aid synthetic catalyst design

BUFFALO, N.Y., June 20 (UPI) -- U.S. chemists have identified the mechanism involved in biological catalysts called enzymes -- a finding that may improve synthetic catalyst design.

"The more that is known about catalysis, the better chances we have of designing active catalysts," said University of Buffalo Professor John Richard, who co-wrote the research with Associate Professor Tina Amyes.

"Attempts to replicate evolution and design catalysts of non-biological reactions with enzyme-like activity have failed, because scientists have yet to unravel the secrets of enzyme catalysis," Richard said.

But, he added, those secrets, once revealed, might transform the chemical industry in a multitude of ways, from processes ranging from soft-drink manufacturing to the production of ethanol.

While attempts to design catalysts have been somewhat successful, Richard said the resulting catalysis is far less efficient than that produced by reactions with enzymes.

Richard explained protein catalysts are distinguished by their enormous molecular weights, ranging from 10,000 to greater than 1 million daltons, whereas a synthetic molecule with a weight of 1,000 would be considered large.

The work by Richard and Amyes provides insight into why effective catalysis requires such large molecules.

The complex research is reported in the journal Biochemistry.