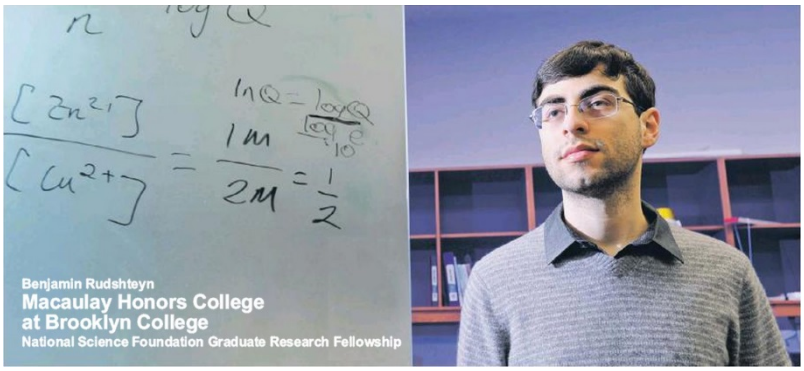
His work is a gas



BENJAMIN RUDSHTEYN wants to destabilize carbon dioxide. This could help minimize the growth of this climate-changing greenhouse gas while producing useful industrial chemicals.

Rudshteyn (Macaulay Honors College at Brooklyn College, '13) is pursuing a doctorate in computational chemistry at Yale University.

With a 2015 National Science Foundation Graduate Research Fellowship that's worth $138,000, he uses computer modeling to create catalysts that can reduce carbon dioxide (that is, make it take on an extra electron).

"By adding one electron, carbon dioxide becomes more unstable, so it reacts more easily with organic compounds and converts them into interesting products," he explains.

Supercomputers let him test possible catalysts far more easily than experimentalists could if they first had to synthesize novel molecules. "Our computational chemistry methods limit the possibilities for new molecules to those that are synthetically reasonable," he says. "We're designing an algorithm that will suggest catalysts with lower barriers for each reaction step, making them more energy efficient."

Rudshteyn's mentor is Yale professor Victor S. Batista, whose theoretical Chemistry group develops and applies new methods for describing quantum processes relevant to photocatalysis (using light to regulate chemical reactions) for both solar energy and the biology of sensory systems.

One of Batista's collaborators, University of Chicago professor Michael D. Hopkins, carries out the experimental side of Rudshteyn's research; Hopkins explores whether tungsten compounds might be the basis for the optimal single-electron reduction of carbon dioxide.

As an undergraduate, Rudshteyn won a highly competitive 2012 Barry Goldwater Scholarship, the premier federal undergraduate science scholarship.

Guided by Brooklyn College chemistry professor Alexander Greer, he ran theoretical simulations on the supercomputer at the CUNY High Performance Computing Center at the College of Staten Island and at the National Science Foundation-supported Extreme Science and Engineering Discovery Environment (XSEDE), the world's most advanced virtual supercomputing system.

In his Goldwater project, he speculated that life could have arisen in the sulfur-rich early Earth before oxygen became abundant or in a similar environment elsewhere in the universe. In published findings, he reported that he generated hypothetical DNA-like strands of a sulfur compound that could have been precursors to amino acids, the building blocks of life.

Born in Brooklyn, Rudshteyn attended Midwood High School. His parents trained as engineers in Belarus and retrained at Brooklyn College.

His father, Alex, earned a master's in computer and information science and is the college's director of library entrepreneurship, systems and network support.

His mother, Anna Rozenbaum, earned a master's in health and nutrition science and works as a dietitian.

NEW YORK POST

27 Sep 2015