

Rensselaer Experiment Finds Water Molecules Are Always H₂O

Researchers at Rensselaer Polytechnic Institute and Ben-Gurion University in Israel have published results of a new experiment that found water molecules are made up of two hydrogen atoms and one oxygen atom, even during very short time intervals. The results dispute previous claims made by another research group suggesting a change in the chemical formula of water.

A research group from Technical University of Berlin, Rutherford Laboratory near Oxford, and Uppsala University in Sweden had previously published research findings indicating that water behaves as if it has lost half a hydrogen atom at very brief time intervals, briefly changing the chemical formula from H₂O to H_{1.5}O.

The effect was revealed through a strong neutron scattering anomaly, which they claimed to have observed.

To address the problem, Rensselaer-Ben-Gurion researchers used neutrons, produced by the electron linear accelerator at Rensselaer's Gaertner LINAC Laboratory, to compare the scattering of neutrons from light water molecules (H₂O) and heavy water molecules (D₂O). Researchers found that the scattering of neutrons behaved normally and they did not detect any deficiency in the effective number of hydrogen atoms in the water molecules. The exposure time of neutrons to the hydrogen nucleus during these experiments was less than 0.001 femtoseconds. A femtosecond is one quadrillionth of a second or 10⁻¹⁵ second.

"This new experiment provides evidence that water is accurately described as H₂O, even at very short time intervals," said Raymond Moreh, visiting scholar in Rensselaer's nuclear engineering and engineering physics program and professor of physics at Ben-Gurion University. "The strong neutron scattering anomaly claimed by an earlier group was not found in our research. Our new finding has far-reaching and profound effects in physics and chemistry."

The members of the Rensselaer research team were: Robert Block, director of the Gaertner LINAC Laboratory and professor emeritus of nuclear engineering; Yaron Danon, assistant professor of nuclear engineering; and Matthew Neuman, senior undergraduate student in nuclear engineering.

The research findings were published in *Physical Review Letters* on May 13 in a paper titled "Search for Anomalous Scattering of keV Neutrons from H₂O-D₂O Mixtures."

Source: Rensselaer Polytechnic Institute

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