Engineering a Desiccant-Driven ($CaCl_2$) Self-Contained Solar Distillation System to Collect Drinking Water from the Atmosphere

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Freshwater accounts for 2.5% of the planet's water, and the U.N.'s estimated 7.7 billion people on Earth are taxing that supply. With 3,100 cubic miles of freshwater vapor trapped in the atmosphere, a desiccant-driven solar distillation system may be a viable solution to a crisis in areas with limited water sources. An octahedron-shaped solar distillation system was designed and built using impact-resistant polycarbonate and stainless steel and tested 45-100 F temperatures under diverse weather conditions. A single person managed this process. Calcium Chloride absorbed ambient water vapor then the still utilized solar energy to regenerate the $CaCl_2$ by forcing it to release H_2O through solar distillation. While productivity was dependent on climatic conditions, the still could produce 6.5 ounces with external temperatures above 85 F. External temperatures below 60 F produced measurable water of 2.5+ oz. with full sun exposure. The predominant factor contributing to higher water collections was the amount of solar exposure on any given day. Insulation of the stainless steel base and black cloth substrates allowed for internal temperatures above 110 F on mid-60 F cold weather days.