

## **Alchemist II: A flexible and consistent automatic pipetting solution for protein crystallization**

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Crystallization has shown to be one of the bottlenecks in macromolecular crystallography. It requires chemical stock solutions of diverse physical and chemical properties, such as viscosity, volatility, and ionic strength to be dispensed consistently and accurately in various volume ranges. The Alchemist II, a robotic liquid handling system from Rigaku, offers a solution that automates the tedious and time-consuming process of producing liquid formulations, increases reproducibility and enables crystallographers the ability to screen a broader selection of conditions.

The Alchemist II, which is equipped with positive pressure displacement pipetting and the unique Tapper technology, is capable of accurately and precisely dispensing a wide range of volumes (1 $\mu$ L to 10mL) and liquid types, including viscous, aqueous and volatile solutions, with precision and accuracy. In this report we present results from studies conducted on representative chemical stock solutions used in macromolecular crystallization. High liquid dispensing precision was observed, with an average CV of less than 2%, for instance, dispensing 50% PEG 8K in volumes ranging between 1 $\mu$ l and 10 $\mu$ l.

Not only does the Alchemist II address the time consuming and repetitive task of coarse and fine screen making, it also promotes confidence in the consistency and accuracy of generating the fine screen requested, illustrated by a crystallization example of a real world protein sample, HSP90, where crystals grew reproducibly in the expected conditions.