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New Methods to Prepare Iodine Derivatives by Vaporizing Iodine Labeling (VIL) and Hydrogen Peroxide VIL (HYPER-VIL). Hideyuki Miyatake, Tomokazu Hasegawa, Akihito Yamano, RIKEN Harima Inst./SPring-8, Sayo-cho, Japan.

We developed new techniques, vaporizing iodine labeling (VIL) and hydrogen peroxide VIL (HYPER-VIL), for the preparation of iodine derivatives. In the VIL, a small amount of KI/I₂ solution is enclosed in a crystallization well, with the result that the gaseous I₂ molecules diffuse into the crystallization droplets without exerting substantial changes of ionic strength in the target crystals. Once they have diffused into the droplet, the I₂ molecules often iodinate accessible tyrosines at *ortho*-positions. When the iodination is insufficient or does not occur, we can further apply the HYPER-VIL technique to increase the iodination ratio by addition of a small droplet of hydrogen peroxide (H₂O₂) to the crystallization well; the gaseous H₂O₂ also diffuses into the crystallization droplet to catalyze the iodination. These techniques are suitable for phase determination when coupled with softer X-rays, such as those from CuK α /CrK α radiations. In addition, synchrotron radiation of longer wavelengths are also effective for phasing with the iodine derivatives. We assessed the effectiveness of these techniques using five different crystals. Consequently, four of the crystals were successfully iodinated providing sufficient phasing power.