

The challenges of growing great crystals – or at least good enough ones!

Alexander J. Blake*

School of Chemistry, University of Nottingham, University Park, Nottingham NG7 2RD, United Kingdom. *Correspondence e-mail: alexanderjohnblake@outlook.com

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The first challenge when composing a guide to growing crystals for crystallographic studies is deciding which techniques to include and, by implication, which to exclude. This question arises because across chemistry and materials science a wide range of techniques are used. Some are highly specialized but are vital to particular fields of study, one example being solvothermal methods for the synthesis of zeolites and metal–organic frameworks.

In this first contribution to the *Best practice* series in *Acta Crystallographica Section C: Structural Chemistry*, Roger Sommer (2024) sensibly concentrates on the solution methods which are the most relevant to the majority of chemists. After a detailed consideration of the advantages of crystallization and of structure determination, the methods outlined are organized so that the simplest, most accessible and most economical techniques are described first. Thus, there are explorations of the potential of slow evaporation, slow cooling and layering; these are followed by descriptions of somewhat more advanced techniques, such as mixed evaporation and vapour diffusion. This last technique (Fig. 1) is flexible, controllable and widely applicable: it does not demand any specialized equipment and so can easily be carried out in a typical chemistry laboratory. It is not uncommon that once the vapour diffusion technique is introduced to a research group, its obvious advantages mean that it rapidly becomes their method of choice.

A short section on sublimation, a technique which offers the possibility of solvent-free crystals, complements the description of the various solution methods. The first two entries in the list of references (Boyle, 2024; Blake, 2024) in the article have more details about sublimation techniques. In fact, the list of references itself comprises a valuable resource: it consists of both refereed publications and online resources, with the latter

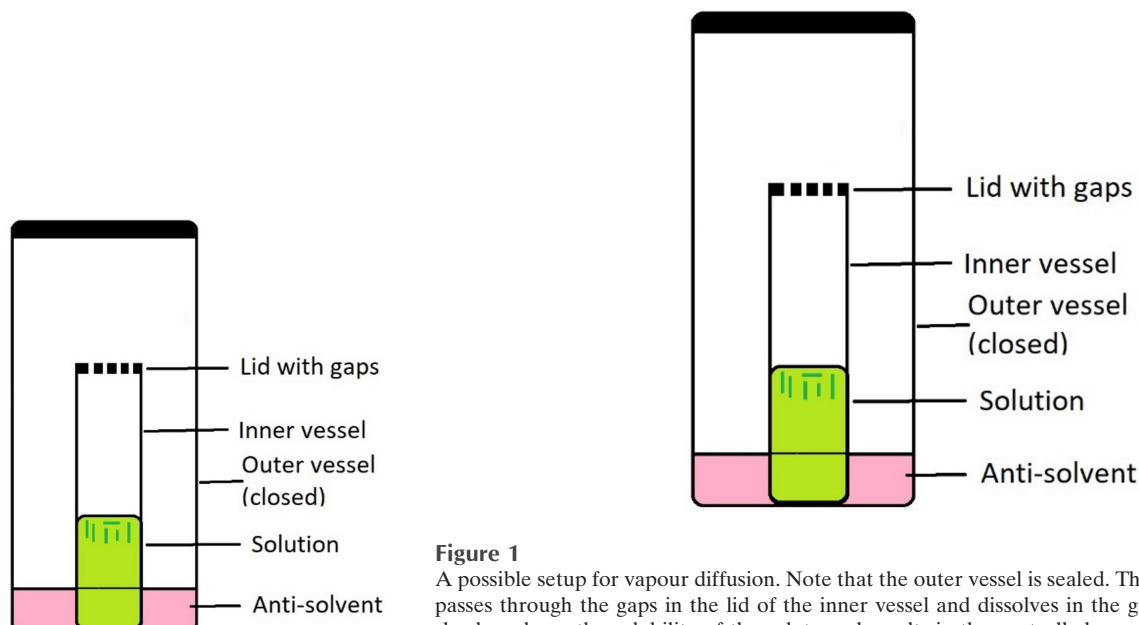


Figure 1
A possible setup for vapour diffusion. Note that the outer vessel is sealed. The more volatile anti-solvent passes through the gaps in the lid of the inner vessel and dissolves in the green solution. This transfer slowly reduces the solubility of the solute and results in the controlled growth of the green crystals.

providing not only more detailed descriptions of some techniques but also links to even more resources.

Overall, the review article provides a concise and effective introduction to the subject of growing crystals suitable for structure determination. For many readers the techniques as outlined will suffice, but for others the article will serve as a springboard to finding the method that works best for their materials.

References

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