

Crystalline Sponge Method: Recent Updates and Applications

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This paper discusses, along with historical background, the principle and the proof-of-concept studies of crystalline sponge (CS) method, a new single-crystal X-ray diffraction (SCD) analysis that can analyze the structures of small molecules without sample crystallization. The method uses single crystalline porous coordination networks, called crystalline sponges, that can absorb small guest molecules into the pores. The absorbed guest molecules are ordered via molecular recognition in the pores and become observable by conventional SCD diffraction analysis. $[[(\text{ZnI}_2)_3(\text{tpt})_2] \cdot x(\text{solvent})]_n$ complex (tpt = tris(4-pyridyl)-1,3,5-triazine) was first proposed as a crystalline sponge and has been most generally used. The principle of the CS method can be described as “post-crystallization” of the absorbed guest, whose ordering is templated by the pre-latticed cavities. The method has been widely applied to synthetic chemistry as well as natural product studies, for which proof-of-concept examples will be shown here.

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