

Abstract

Studies on the Development of Capture Compounds for Selective Detection of Proteins, Small Molecules and Metal Ions and Synthesis of *Bis*-quinones

The selective isolation and identification of proteins using a capture compound across the proteome in complex biological samples is a challenge in modern drug discovery. A capture compound is a tri functional molecule possessing: a **selective function** for reversible binding to its targeted protein; a **reactive function** to stitch the capture molecule to the enzyme a **sorting function** for detection of captured protein. Following this principle (**Figure 1**), we have designed fluorophore and azo benzene based molecules to capture Human Carbonic Anhydrase-II (HCAII) by exploiting its reversible interaction with the sulfonamide functionality present in the capture compound. The capturing could be analysed by a simple SDS-PAGE analysis or by MALDI mass spectrometry. A related principle can also be adopted to detect the capture of metal ions via a matrix-free MALDI mass spectrometric technique using a ligand attached with a polyaromatic tag. If the ligand is tailor made for a specific metal ion or small molecule, it will be possible to detect the presence of that particular small molecule or metal ion in a mixture of other metal ions as well as other organic molecules. The principle is that in absence of matrix, only those peaks will be observed where the polyaromatic tagged ligand is present, free or bound to metal ions. The situation is described in **Figure 2**.

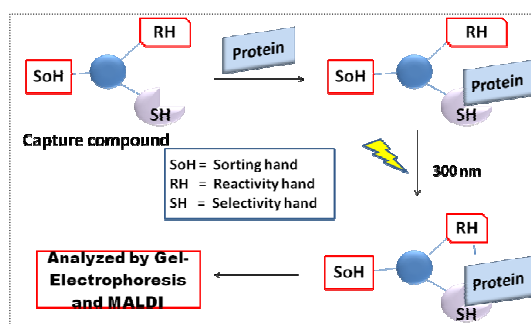


Figure 1: Protein capture protocol

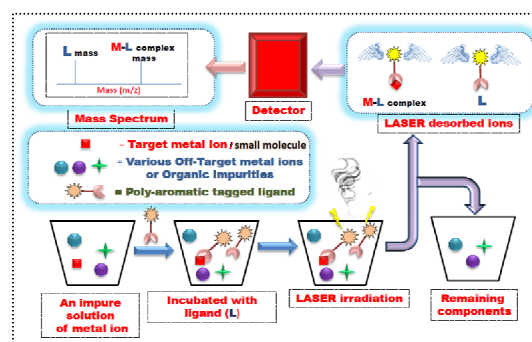


Figure 2: LA-LDI based detection protocol

Carbon-carbon bond formation reactions are extremely attractive in the field of organic chemistry. Diels Alder or related cyclization reactions are so far the best examples of such kind. Garratt- Braverman reaction could be of the same importance. But it was ignored for more than thirty years. Here we tried to explore the synthetic potential of GB reaction for the synthesis of bis-quinones having C1-C2' connectivity. Using this method we have synthesized some bis-quinone. Later on these molecules are found to have DNA intercalative nature.

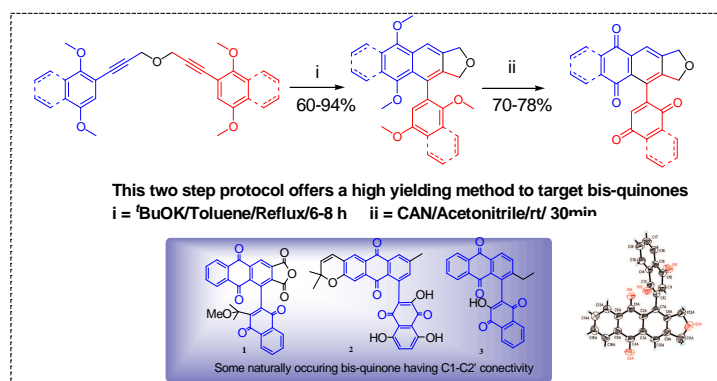


Figure 3: A simple two step Garratt-Braverman protocol for the synthesis of bis-quinones