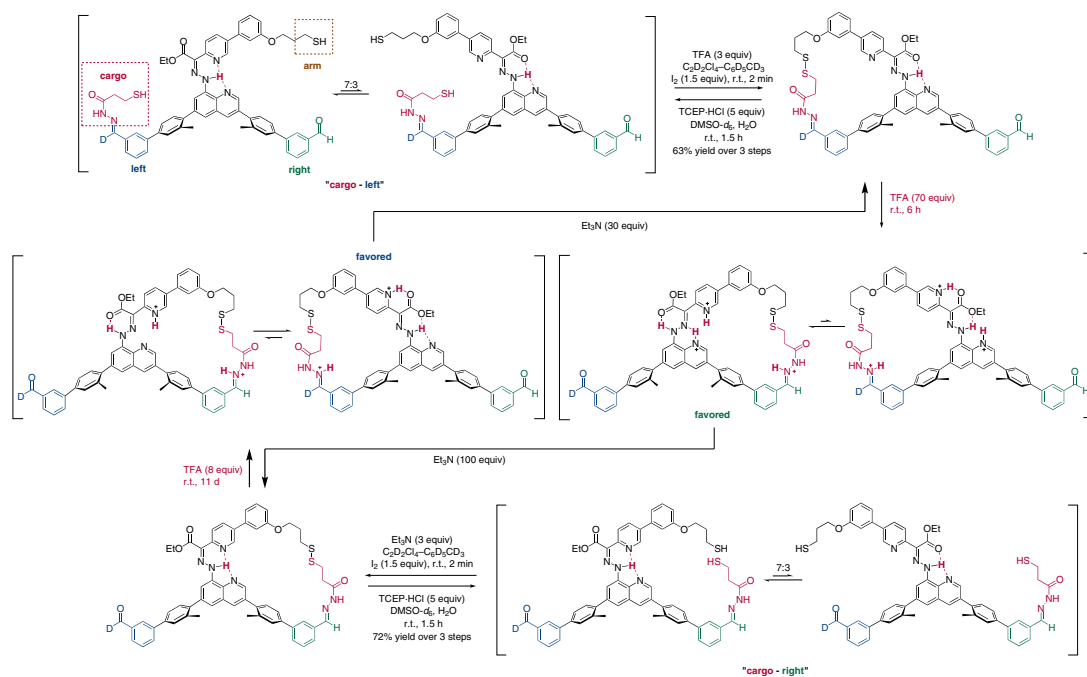


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Pick-Up, Transport and Release of a Molecular Cargo Using a Small-Molecule Robotic Arm

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A Molecular Pickup



Significance: The idea of using small-molecule machines to manipulate other molecules in analogy to macro biomolecule systems is intriguing. In this report, the authors described a synthetic bi-directional small-molecule transporter system that can move a molecular fragment between two sites through a series of covalent bond formation/cleavage processes.

Comment: The transporter system consists of two benzaldehyde-based cargo platform sites, an alkyl thiol arm, a hydrazone-based rotary switch, and a quinoline-based stator. The acylhydrazone cargo rests on the platform through the formation of the corresponding hydrazone adduct. The 'pick-up' and 'release' of the cargo is realized through disulfide bond formation/cleavage and dynamic hydrazone formation reactions. The key to the bidirectional relocation of the cargo is the controlled rotation about the center $C_{aryl}-N$ bond toward either side. This is achieved by selective protonation of the quinoline-based stator at different proton equivalents.

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