

Supporting information for 9-BBN: An Amino Acid Protecting Group for Functionalization of Amino Acid Side Chains in Organic Solvents  
William H Dent III, W. Randal Erickson, Stephen C. Fields, Marshall H. Parker and Eric G. Tromiczak

## EXPERIMENTAL

**Formation:** To 150 mL MeOH in a 250 mL RBF at rt under N<sub>2</sub> was added 1.1 eq. 9-BBN dimer (Aldrich). The mixture was heated at reflux until the 9-BBN was completely dissolved (30 min), after which time 25 mmol of amino acid was added. The resultant suspension was heated an additional 3 hours during which time gas evolution ceased and the suspension became a clear homogeneous solution. (Additional 9-BBN may be necessary to completely react the amino acid, depending on the age and quality of the materials). The MeOH was removed (rotary evaporator) and the residue dissolved in hot THF (100 mL), filtered, and the filtrate concentrated to a white gummy residue. The residue was triturated with hot hexanes and/or diethyl ether and then subjected to high vacuum for 1 hour (0.1 mm Hg) during which time it became an amorphous solid. This material was >95% pure by <sup>1</sup>H NMR and was used without further purification. Pure samples were obtained with a single pass down a reversed-phase C<sub>18</sub> hplc column using 50% MeCN-water as the eluent.<sup>17</sup>

**Solubility Studies.** To 0.5, 1.0 and 5.0 mmol complex in a 20 dram vial was added 10 mL solvent. The vial was capped and shaken vigorously for 1-2 min. The notations of I (Insoluble - insoluble at all 3 concentrations), SS (Slightly Soluble - soluble at 0.05 M only), S (Soluble - soluble at 0.05 and 0.10 M only), and VS (soluble at all 3 concentrations) were used to define at which concentrations a clear, homogeneous solution was created. Occasionally sonication was required to effect dissolution when the materials were purified to dry powders.<sup>17</sup>

**Cleavage A:** The 9-BBN complex was dissolved in MeOH (2mL/mmol) and to this solution was added conc. HCl (1 mL/mmol). After the exothermic reaction ceased, the solution was stirred at rt 10 min and then concentrated *in vacuo* (rotary evaporator). The residue was digested with THF, filtered, and the precipitate washed with THF to remove the BBN residue. The resultant solid was exposed to high vacuum for 1 hour (< 0.1 mm Hg) to give NMR pure amino acid HCl salt, which could be converted to the free amino acid by warming with excess propylene oxide in aqueous methanol for several minutes. Analytically pure samples were obtained with a single pass down a reversed-phase C<sub>18</sub> hplc column using pure water as the eluent.

**Cleavage B:** Excess ethylene diamine (3.0 mL, 45 mmol) was added to a solution of 10 mmol of the 9-BBN complex in THF (20 mL) in a 50 mL erlenmeyer and heated to just below boiling (heat gun) for 1 minute. The mixture was cooled and filtered (vacuum filtration). The precipitate was washed with THF (3 x 50 mL) and dried *in vacuo* to give 92-95% pure material by NMR. Analytically pure samples were obtained with a single pass down a reversed-phase C<sub>18</sub> hplc column using water as the eluent.

