A potential target in the development of new treatments against antibiotic-resistant *Staphylococcus aureus* is the disruption of iron acquisition by the heme oxygenase (HO) IsdG, which is unique compared to human HO. Researchers have shown that the N7A mutation inactivates IsdG, and it is hypothesized that heme degradation involves hydrogen bond donation from N7 to an oxygen atom in an iron-peroxide intermediate. This intermediate quickly degrades and is difficult to characterize, so azide (N_3) was chosen to mimic the hydrogen bonding characteristics of peroxide. After determining a protein:N_3 ratio of 1:10,000 was required to overcome heme binding difficulties due to N_3's larger size, the resulting holoprotein was characterized with magnetic circular dichromism (MCD) spectroscopy. Variable-temperature, variable-field data suggests N_3-bound heme is S= ½. Since N_3 has similar ligand donor strength as peroxide, this suggests the peroxide-bound enzyme may also be S= ½. Also, α/β regions of the MCD spectrum are very different in N_3-and CN-bound heme, suggesting this region of the spectrum is sensitive to axial bond strength. Current work involves mutating N7 to alanine and comparing shifts in the N_3-and CN-bound IsdG MCD spectra to determine the effects of N7-to-ligand hydrogen-bond donation on the axial iron-ligand bond strengths and substrate reactivity.