Oxime derivatives of amino acids, amides, and peptides are very efficient ligands for Ni^{II} ions forming very stable water-soluble complexes. Oxime of amino acids amides forms octahedral and square-planar complexes with the same 4N coordination mode. The spectroscopic and X-ray diffraction studies indicate an unusual role for the hydrogen bond in $NiH_{-1}L_2$ species, which stabilizes the cis coordination of two ligands in a planar complex. Oxime analogs of natural amino acid can be much more efficient ligands than the parent molecules.