Iron-sulfur clusters containing proteins are quite abundant in nature. These proteins have special functions that result from the type of iron-sulfur (Fe-S) cluster they contain. The most frequently occurring clusters are: Fe\textsubscript{2}S\textsubscript{2}, Fe\textsubscript{3}S\textsubscript{4}, Fe\textsubscript{4}S\textsubscript{4} with ligands completing the Fe co-ordination. These structures are modular in nature and can undergo oxidation-reduction reactions in proteins. They also act as catalytic centers; can act as sensors for iron and oxygen, and influence protein structure by preferential side chain ligation. Given the multiplicity of function and high occurrence of these modular structures in biology, it is of great interest to understand the chemistry behind their function. A study of various inorganic facets of the Fe-S cluster; like the spin state of the cluster studied by EPR spectroscopy, is of importance as it helps us to understand the catalytic action at the metal site. Most of the oxidation states of the cluster are paramagnetic; EPR and Mossbaur Spectroscopy are being used to investigate the magnetic properties of the mixed valence systems observed. Resonance Raman studies have been done on the complex Fe-S clusters to study cluster conversion from Fe\textsubscript{2}S\textsubscript{2} to Fe\textsubscript{4}S\textsubscript{4}. These studies are useful to understand how these clusters mediate protein structure and related function. ENDOR experiments have been used to study the mode of substrate binding to iron site during catalysis. X-ray crystallographic methods have been used to study the difference in coordination geometry between the active cluster and the inactive one, for example, the difference between the geometry of inactive (3Fe-4S)\textsuperscript{+} to (4Fe-4S)\textsuperscript{2+} in acotinase enzyme. This review will examine several inorganic aspects of the Iron-sulfur cluster, with a focus on the complex nitrogenase Fe-S cluster.

References:
