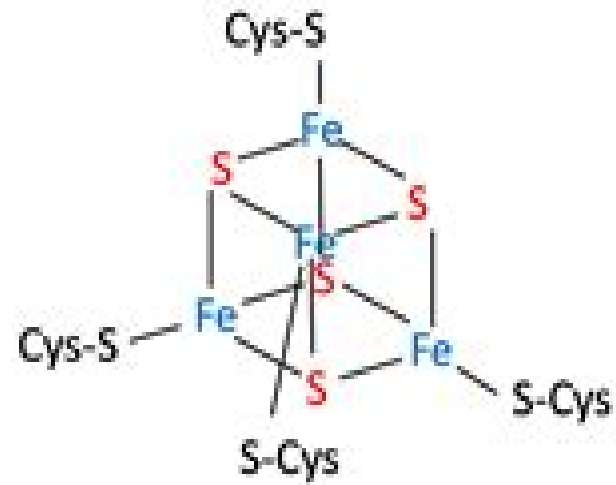
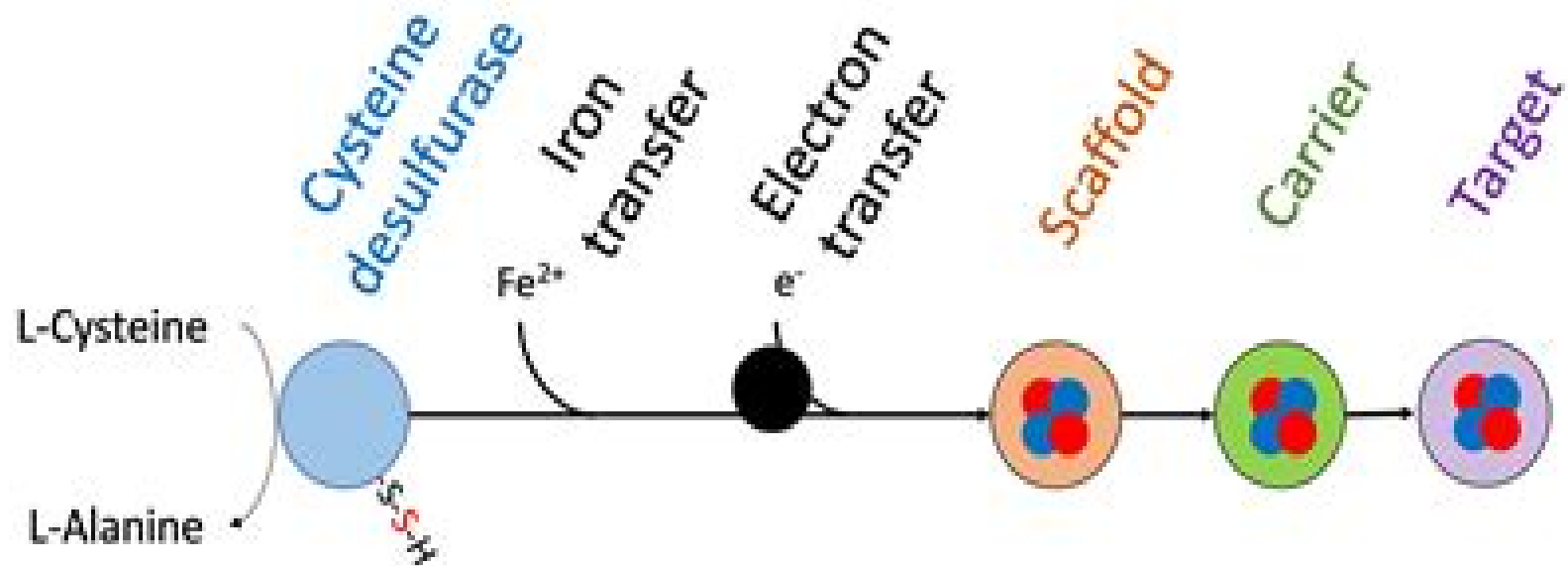


[2Fe2S]



[4Fe4S]



# Iron Sulfur Cluster

**Ivano Bertini**

A decorative red circular graphic with a gradient, appearing as a partial circle or a thick arc, located to the right of the light blue bar.

## Iron Sulfur Cluster

*Iron-Sulfur Clusters in Chemistry and Biology* Tracey Rouault, 2014-08-20 This volume on iron sulfur proteins includes chapters that describe the initial discovery of iron sulfur proteins in the 1960s to elucidation of the roles of iron sulfur clusters as prosthetic groups of enzymes such as the citric acid cycle enzyme aconitase and numerous other proteins ranging from nitrogenase to DNA repair proteins The capacity of iron sulfur clusters to accept and delocalize single electrons is explained by basic chemical principles which illustrate why iron sulfur proteins are uniquely suitable for electron transport and other activities Techniques used for detection and stabilization of iron sulfur clusters including EPR and Mossbauer spectroscopies are discussed because they are important for characterizing unrecognized and elusive iron sulfur proteins Recent insights into how nitrogenase works have arisen from multiple advances described here including studies of high resolution crystal structures Numerous chapters discuss how microbes plants and animals synthesize these complex prosthetic groups and why it is important to understand the chemistry and biogenesis of iron sulfur proteins In addition to their vital importance in mitochondrial respiration numerous iron sulfur proteins are important in maintenance of DNA integrity Multiple rare human diseases with different clinical presentations are caused by mutations of genes in the iron sulfur cluster biogenesis pathway Understanding iron sulfur proteins is important for understanding a rapidly expanding group of metabolic pathways important in all kingdoms of life and for understanding processes ranging from nitrogen fixation to human disease

## TRANSITION METALS AND SULFUR ,2020

*Iron-sulfur Clusters in Chemistry and Biology* Tracey A. Rouault, 2017

**Principles of Bioinorganic Chemistry** Stephen J. Lippard, Jeremy Mark Berg, 1994 The use of unnatural metals which have been introduced into human biology as diagnostic probes and drugs is another active area of tremendous medical significance

**Iron-sulfur Cluster Biosynthesis. Iron-sulfur Cluster Transfer from Holo ISU and ISA to Apo Ferredoxin** Shu-Pao Wu, 2004  
Abstract The processes of iron sulfur cluster transfer from holo ISU and ISA to apo Fd were studied Direct cluster transfer from holo ISU to apo Fd was demonstrated by Mossbauer spectroscopy Experimental data shows that an intact 2Fe 2S core is transferred to target proteins Substitution of a key aspartate residue Asp 37 of ISU is found to decrease the rate of cluster transfer by at least an order of magnitude The rate constants of cluster transfer from native ISA to Fd are shown to be similar to those of cluster transfer from Cys derivatives of ISA The factors that contribute to cluster transfer efficiency also appear to be similar including the importance of cluster lability and solvent accessibility Both ISA and ISU mediated Fe S cluster transfer to apo Fd have been shown to be pH dependent The pKa of ISA is 7.8 slightly higher than the value of 6.9 found for ISU This is consistent with deprotonation of a solvent accessible cysteine which would thereby provide a more effective nucleophilic center for facilitating cluster transfer to apo Fd Viscosity studies show that diffusion is not the rate limiting step which is most likely the process of Fe S cluster transfer between the intermediate complexes ISU Fd and ISA Fd The influences of the binding of DnaK to IscU were studied DnaK can maintain a stable structure of ferric ion bound IscU and avoids aggregation triggered by ferric ions Also DnaK bound IscU has more stable iron sulfur clusters Kinetic studies of Fe S cluster transfer from holo IscU to apo Fd in the presence of DnaK reveal that the binding of DnaK to IscU slows down the rate of Fe S cluster transfer from IscU especially formation of IscU Fd complexes Binding of DnaK decreases the rates of forming IscU Fd complexes greater than 8 fold and also causes a minor change on the rates of iron sulfur cluster transfer in IscU Fd complexes In other words binding of DnaK to IscU does not facilitate the process of Fe S cluster transfer from IscU

**Biological Inorganic Chemistry** Ivano Bertini, 2007 Part A Overviews of biological inorganic chemistry 1 Bioinorganic chemistry and the biogeochemical cycles 2 Metal ions and proteins binding stability and folding 3 Special cofactors and metal clusters 4 Transport and storage of metal ions in biology 5 Biominerals and biomineralization 6 Metals in medicine Part B Metal ion containing biological systems 1 Metal ion transport and storage 2 Hydrolytic chemistry 3 Electron transfer respiration and photosynthesis 4 Oxygen metabolism 5 Hydrogen carbon and sulfur metabolism 6 Metalloenzymes with radical intermediates 7 Metal ion receptors and signaling Cell biology biochemistry and evolution Tutorial I Fundamentals of coordination chemistry Tutorial II

**Iron-sulfur Cluster Assembly in Aqueous Media** William Charles Stevens, 1986

*A Structural Perspective on Respiratory Complex I* Leonid Sazanov, 2012-05-11 The book contains chapters written by leaders in the research on the structure and function of respiratory complex I. It will provide a concise and authoritative summary of the current knowledge on complex I of respiratory chains. This enzyme is central to energy metabolism and is implicated in many human neurodegenerative diseases as well as in aging. Until recently it was poorly understood on a structural level and this book will provide a timely reference resource. Such a book was not published previously. The last time a minireview series on complex I were published was in 2001 and since then complex I field changed quite dramatically.

**Iron-sulfur Clusters in Chemistry and Biology** Tracey A. Rouault, 2017 This volume on iron sulfur proteins includes chapters that discuss how microbes, plants, and animals synthesize these complex prosthetic groups and why it is important to understand the chemistry and biogenesis of iron sulfur proteins. In addition to their vital importance in mitochondrial respiration, numerous iron sulfur proteins are important in maintenance of DNA integrity. Multiple rare human diseases with different clinical presentations are caused by mutations of genes in the iron sulfur cluster biogenesis pathway. Understanding iron sulfur proteins is important for understanding a rapidly expanding group of metabolic pathways important in all kingdoms of life and for understanding processes ranging from nitrogen fixation to human disease.

**Fe-S Proteins** Patricia C. dos Santos, 2021 This volume explores current technologies used to investigate the formation, insertion, and function of metalloclusters associated with proteins. Chapters describe relevant topics about Fe-S cluster metabolism, are explored through genetic, biochemical, spectroscopic methods. Written in the highly successful *Methods in Molecular Biology* series format, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. *Authoritative and cutting edge Fe-S Proteins: Methods and Protocols* aims to be a useful practical guide to researchers to help further their study in this field.

*Iron-Sulfur Proteins*, 1999-06-07 *Advances in Inorganic Chemistry* presents timely and informative summaries of the current progress in a variety of subject areas within inorganic chemistry, ranging from bioinorganic to solid state. This acclaimed series features reviews written by experts in the area and is an indispensable reference to advanced researchers. Each volume of *Advances in Inorganic Chemistry* contains an index and each chapter is fully referenced.

**Biomimetic Function of Iron Sulfur Clusters with Alternative Ligands** Marie Bergner, 2017-12-07 Iron sulfur clusters are essential cofactors involved in electron transfer sensing and catalysis in all three kingdoms of life While most iron sulfur clusters are ligated by cysteine thiolates a number of clusters featuring so called alternative ligands such as histidine have been recognized in recent years This work uses synthetic 2Fe 2S analogues to explore the role alternative ligands play in determining the reactivity of iron sulfur clusters Isomerization in a homoleptically coordinated cluster utilizing a mixed nitrogen and sulfur donating ligand is investigated as a model for ligand rearrangement processes during iron sulfur cluster biogenesis Furthermore a high fidelity model system for the asymmetrically ligated 2Fe 2S cluster of mitoNEET proteins is developed and characterized in detail This cluster and its homoleptic analogue are studied as reagents in proton coupled electron transfer processes highlighting the role asymmetry and reorganization energy play in tuning this reactivity The effects of the ligation pattern on entropic contributions during reduction are probed by temperature dependent electrochemical measurements Finally synthetic 2Fe 2S clusters are investigated with respect to their reactivity with organic radicals mimicking the unique reactivity of biotin synthase

**Structural Insight Into the Assembly of Iron-sulfur Clusters and Their Function in Radical Generation** Jessica Lynn Vey, 2008 This thesis addresses two emerging areas in the study of iron sulfur cluster biochemistry bioassembly of iron sulfur clusters and their involvement in initiation of radical chemistry The structure of a cysteine desulfurase involved in cluster bioassembly in the cyanobacterium *Synechocystis* PCC sp 6803 was solved by X ray crystallography and analyzed in terms of its mechanistic implications We found that the active site cysteine responsible for the direct removal of sulfur from substrate cysteine is located on a short well ordered loop consistent with structures solved of homologous proteins The length of this loop is thought to restrain the active site cysteine interfering with its ability to affect catalysis Our results are consistent with the theory that this cysteine desulfurase requires an accessory protein for fully activity in vivo Two structures of pyruvate formate lyase activating enzyme from *Escherichia coli* an S-adenosylmethionine radical enzyme were also solved by X ray crystallography providing the first structure of an activase from this family of enzymes These structures revealed the enzyme's active site and the residues involved in binding and orienting substrate for hydrogen atom abstraction Comparison of the structures of the substrate free and substrate bound forms of the enzyme identified a conformational change associated with substrate binding Detailed analyses of the structure of pyruvate formate lyase activating enzyme were carried out to provide insight into catalysis These structures were also analyzed in comparison with other S-adenosylmethionine radical enzyme structures to more clearly understand the structural basis for reactivity in this superfamily

*Insights on Iron-sulfur Cluster Assembly Donor Proteins* Eric Michel Dizin, 2008 Abstract Iron sulfur clusters are an important class of prosthetic group involved in electron transfer enzyme catalysis and regulation of gene expression Their biosynthesis requires a complex machinery located within the mitochondrion since free iron and sulfide are extremely toxic to the cell This research has focused on the three central proteins dedicated to the assembly a cysteine desulfurase Nfs1 an iron donor protein frataxin and an iron sulfur cluster scaffold protein Isu1 Human Nfs1 a PLP dependent enzyme catalyzes the decomposition of cysteine to alanine and forms a persulfide bond with a conserved cysteine residue To date Nfs1 has only been partially characterized Furthermore its hyperproduction relies on yeast organism *Pichia pastoris* which is cumbersome and leads to quite low yields Therefore we undertook to design a bacterial expression system by cloning and overexpressing the gene in different *E. coli* strain This enabled only a partial characterization of the cysteine desulfurase Besides being an iron donor for iron sulfur cluster assembly frataxin has also been implicated in heme biosynthesis and in iron storage in the mitochondrion with reported ferroxidase activity We decided to further investigate its ability to bind to other metals such as magnesium calcium and zinc and also studied its ferroxidase activity as a mature and as a truncated protein We concluded that frataxin has negligible ferroxidase activity comparable to iron and quite distinct from ferritin Moreover frataxin binds zinc besides iron but with a different stoichiometry

*Iron Sulfur Cluster Compounds* Anita Gay Pinson, 1978

*Vanadium-iron-sulfur and Molybdenum-iron-sulfur Cluster Chemistry* Julia A. Kovacs, 1986

**The Synthesis and Characterization of a Novel Hexanuclear Iron-sulfur Cluster** Gay Olivier Lilley, 1985

**Symbiontism and the origin of species** I.E. Wallin, 1927

*Electrochemical Investigations Into Iron-sulfur Cluster Containing Proteins* Gareth John Tilley, 2001

**Iron-Sulfur Cluster Assembly ; in Vivo Analysis of the Methanogenic SUF System** Evan Dunkle, 2019

Iron Sulfur Cluster: Bestsellers in 2023 The year 2023 has witnessed a remarkable surge in literary brilliance, with numerous compelling novels enthralling the hearts of readers worldwide. Lets delve into the realm of bestselling books, exploring the engaging narratives that have charmed audiences this year. Iron Sulfur Cluster : Colleen Hoover "It Ends with Us" This heartfelt tale of love, loss, and resilience has captivated readers with its raw and emotional exploration of domestic abuse. Hoover masterfully weaves a story of hope and healing, reminding us that even in the darkest of times, the human spirit can succeed. Iron Sulfur Cluster : Taylor Jenkins Reids "The Seven Husbands of Evelyn Hugo" This spellbinding historical fiction novel unravels the life of Evelyn Hugo, a Hollywood icon who defies expectations and societal norms to pursue her dreams. Reids compelling storytelling and compelling characters transport readers to a bygone era, immersing them in a world of glamour, ambition, and self-discovery. Discover the Magic : Delia Owens "Where the Crawdads Sing" This captivating coming-of-age story follows Kya Clark, a young woman who grows up alone in the marshes of North Carolina. Owens crafts a tale of resilience, survival, and the transformative power of nature, entrancing readers with its evocative prose and mesmerizing setting. These popular novels represent just a fraction of the literary treasures that have emerged in 2023. Whether you seek tales of romance, adventure, or personal growth, the world of literature offers an abundance of captivating stories waiting to be discovered. The novel begins with Richard Papen, a bright but troubled young man, arriving at Hampden College. Richard is immediately drawn to the group of students who call themselves the Classics Club. The club is led by Henry Winter, a brilliant and charismatic young man. Henry is obsessed with Greek mythology and philosophy, and he quickly draws Richard into his world. The other members of the Classics Club are equally as fascinating. Bunny Corcoran is a wealthy and spoiled young man who is always looking for a good time. Charles Tavis is a quiet and reserved young man who is deeply in love with Henry. Camilla Macaulay is a beautiful and intelligent young woman who is drawn to the power and danger of the Classics Club. The students are all deeply in love with Morrow, and they are willing to do anything to please him. Morrow is a complex and mysterious figure, and he seems to be manipulating the students for his own purposes. As the students become more involved with Morrow, they begin to commit increasingly dangerous acts. The Secret History is a masterful and thrilling novel that will keep you guessing until the very end. The novel is a cautionary tale about the dangers of obsession and the power of evil.

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