

Advanced Bioinorganic Chemistry (KDIT115)

Lecturer:

Dr. Gyurcsik Béla (gyurcsik@chem.u-szeged.hu)

Curriculum:

- Oxygen metabolism – role of metal ions
 - Dioxygen carrier and storage (hemoglobin, mioglobin, hemerythrin, hemocyanine)
 - Oxidation by dioxygen (iron/copper/manganese enzymes)
 - The respiratory chain and cytochrome c oxidase ($O_2 \rightarrow H_2O$)
 - Reactive oxygen species (ROS) and the defense system against them
- Photosynthesis – role of metal ions
 - Mg^{2+} in the light harvesting process
 - Cu^{+2+} , $Fe^{2+/3+}$ in electron transport processes
 - Mn^{x+} and Ca^{2+} in photosynthetic oxygen evolution ($H_2O \rightarrow O_2$)
 - Mg^{2+} in organic synthesis
- Metalloenzymes in the nitrogen cycle
 - Mo, W and V - in nitrogen fixation
 - $Fe^{2+/3+}$ in electron transport processes
 - Cu^{2+} and $Fe^{2+/3+}$ in redox chemistry of nitrogen compounds
- Metalloenzymes involved in the metabolism of C1 compounds
 - Methanogenesis
 - Methanotrophy (Methane Monooxygenases)
 - CO/ CO_2 interconversion (monofunctional Carbon Monoxide Dehydrogenases, Bifunctional Ni, Fe-Containing Carbon Monoxide Dehydrogenases/Acetyl coenzyme A synthase)
- The complex physiological effects of metal ions
 - Signal transmission along the axons
 - Muscle function
 - Unique properties achievable by the finetuning of metal ion environment
- A molecular biology approach to bioinorganic chemistry problems
 - Methods of protein synthesis and purification.
 - Methods of protein modification
- Journal club: 15-20 minutes presentation of a selected bioinorganic chemistry publication from a high ranked international journal (Science, Nature) and 15-20 min discussion with all participants.